CITY OF SCOTTSDALE

Abbreviated Water and Sewer Needs

HUNTER
ENGINEERING

CIVIL AND SURVEY

Sewer Basis of Design Report
For
DC Ranch Lot 15/Fetzer
9217 E. Verde Grove View
Scottsdale, Arizona 85255

FINAL Basis of Design Report

☑ APPROVED

☐ APPROVED AS NOTED

☐ REVISE AND RESUBMIT

CITY OF SCOTTSDALE

SCOTTSDALE WATER
9379 E San Salvador Dr.
Scottsdale, AZ 85258

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

BY scan DATE 11/12/2020

Accepted 11/12/2020

Registered Professional Engineer (Civil)
CERTIFICATE NO.
36669
JORGE A.
ORTIZ
Date Signed 10/21/20
ARIZONA U.S.A.

October 2020

Prepared by:
Hunter Engineering, Inc.
10450 North 74th Street, #200
Scottsdale, AZ 85258

23-DR-2020
23-DR-2020
11/02/20

SEWER BASIS OF DESIGN REPORT
FOR

DC RANCH LOT 15/FETZER

9217 E. VERDE GROVE VIEW
SCOTTSDALE, ARIZONA 85255

PREPARED FOR

LGE DESIGN BUILD
1200 NORTH 52ND STREET
PHOENIX, AZ 85008

PREPARED BY

JORGE ORTIZ, P.E.
HUNTER ENGINEERING, INC.
10450 NORTH 74TH STREET, #200
SCOTTSDALE, AZ 85258
(480) 991-3985

OCTOBER 2020
H.E. PROJECT NO. LGEC275

Table of Contents

1.0 INTRODUCTION

This sewer basis of design report has been prepared under a contract from LGE Design Build, developer of the DC Ranch Lot 15/Fetzer project. The purpose of this report is to provide a final sewer analysis, required by the City of Scottsdale, to support this development. Preparation of this report has been done according to the procedures detailed in Chapter 4 of the *City of Scottsdale Design Standards & Policies Manual dated January, 2018 (CSDSPM) (Reference 1), City of Phoenix Water Services Department, Design Standards Manual for Water and Wastewater Systems, 2017 (Reference 2) and the Final Master Design Report - Sanitary Sewer for Corporate Center at DC Ranch, dated April 2006 and prepared by Hunter Engineering (Reference 3).*

This development project is located south of Verde Grove View and east of Hidden Spur Trail within the City of Scottsdale, Maricopa County, Arizona. The proposed project is located within an existing undeveloped site. The existing parcel is bound by Verde Grove View to the north, a commercial development to the south and Hidden Spur Trail to the west corporate center at DC Ranch. The site is specifically located in section 34, Township 4 North, Range 5 East, of the Gila and Salt River Base and Meridian. Figure 1, in Appendix A, illustrates the location of the project site in relation to the City of Scottsdale street system. Access to the site is provided from Verde Grove View.

The development proposes the construction of two new buildings. The proposed uses for both buildings are office/warehouse. The current zoning is I-1 Site improvements will include construction of driveway entrances, a parking lot, sidewalk/hardscape, landscape areas, and supporting infrastructure including new storm water drainage system, water, sewer and fire line service. The overall project site is approximately 3.62 ac.

2.0 EXISTING CONDITIONS

The proposed project is located on an undeveloped parcel. There is an existing 8-inch public sewer main located on Verde Grove View and at Hidden Spur Trail.

3.0 PROPOSED SEWER COLLECTION SYSTEM

This project proposes to connect to the existing public 8-inch gravity sewer line at Verde Grove View. Because the property is being planned to be subdivided, two lots connections are being proposed. Wastewater flows for the proposed site were calculated in accordance with the CSDSPM (Reference 1). An office use average day sewer demand (ADSD) of 0.4 and peaking factor of 3 was obtained from the CSDSPM Figure 7.1-2.

According to Section 7-1.402 of the CSDSPM, for ADSD uses not listed in Figure 7.1-2, the City of Scottsdale allows the use of demands from regional accepted references. The demands for warehouse use is not on Figure 7.1-2. As such the ADSD for this use was based on Figure 11 of the City of Phoenix Design Standards Manual for Water and Wastewater Systems (2017). The demands for warehouse use according to Figure 11 is 25 gallons per day per every 1000 sf and a peaking factor of 3 was used.

According to the calculations provided in Appendix B, the proposed Building A will have an estimated Average Daily Flow of 1, 943 GPD and a Peak Hour Flow of 3.9 GPM. The proposed Building B will have an estimated Average Daily Flow of 2, 825 GPD and a Peak Hour Flow of 6 GPM. Refer to Appendix B for pipe capacity calculations for the proposed 8-inch private sewer line and the existing 8- inch public sewer line. The total project Average Daily Flow is 4,768 GPD and the Peak Hour Flow is 10 GPM. This demand was used to calculate the proposed and existing pipe capacities. The Peak Flow estimated with the Final Master Design Report - Sanitary Sewer (FMDRSS) for Corporate Center at DC Ranch Lot 15 was be 7.3 GPM. This is less than the Peak Flow estimated with this report. The FMDRSS estimated Peak Flow estimated for the sewer at Hidden Grove View (Northern Sewer Section) was 65 GPM.

The capacity analysis calculation for the proposed 6-inch and 8-inch service lines is as follows:

- With 1.1% slope flowing full, the capacity is 264 GPM.
- With 0.35% slope flowing full, the capacity is 334 GPM.
- With 0.35% slope flowing 2/3full, the capacity is 158 GPM.

The capacity of the existing 8-inch sewer line is greater than estimated Peak Flow of 65 GPM. The capacity of the proposed 6-in sewer service line is greater than the estimated Peak Hour Flow of 3.9 and 6 GPM generated from Building A and B.

The sanitary sewer pipe and fitting material for this project has been designated as PVC SDR-35. Trenching and bedding details for this project are to be per MAG Standard Specifications Section 601. Trench width above the installed pipe may be as wide as necessary to properly brace/install the work. Bedding backfill and compaction shall be installed per MAG Standard Specification 601.4. Service lines should connect to sewer according to MAG Standard Detail No. 440-3.

4.0 CONCLUSIONS

Based on the results of this study, it can be concluded that:

- The existing public sewer system and proposed sewer service is adequate to support this development.

5.0 REFERENCES

1) City of Scottsdale Design Standard & Policies Manual, January 2018 (Ref 1).
2) City of Phoenix Water Services Department, Design Standards Manual for Water and Wastewater Systems, 2017 (Ref 2).
3) Final Master Design Report - Sanitary Sewer for Corporate Center at DC Ranch, dated April 2006 and prepared by Hunter Engineering (Ref 3).

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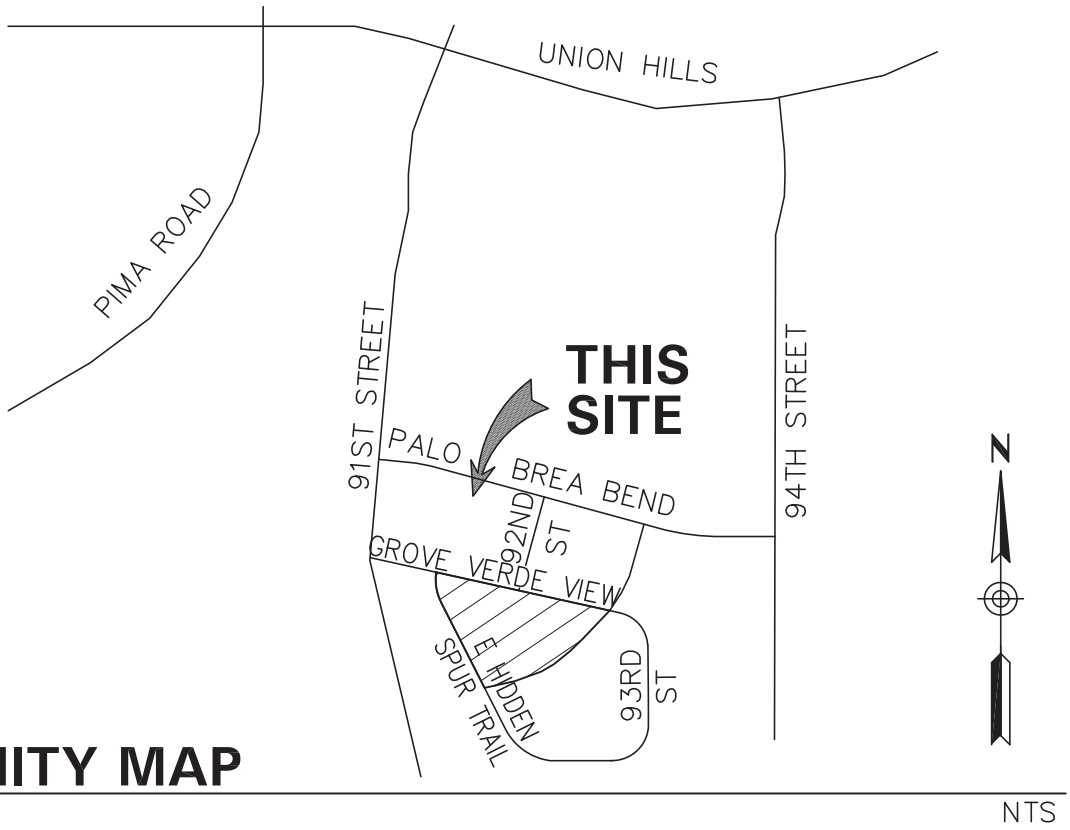
FIGURES

APPENDIX B
SEWER CAPACITY WORK SHEET

APPENDIX C
REFERENCES

APPENDIX D
UTILITY PLAN

APPENDIX A
FIGURES



VICINITY MAP

NTS

APPENDIX B
SEWER CAPACITY WORK SHEET

Project: Fetzer
Project No.: LGEC275
City: SCOTTSDALE, AZ
Date: 7/21/2020

PROJECTED SANITARY SEWER LOADS

Land Use	Building Area (sf)	Average Day Sewer Demand (gpd) City of Scottsdale Figure 7-1.2 (Office) City of Phoenix Figure 11 (Wharehose)		Peaking Factor Figure 7-1.2	Average Daily Flow (gpd)	Average Daily Flow (gpm)	Peak Flow (gpm)
Building A - Office	4,092	0.4	per sf	3	1,637	1.1	3.3
Building A - Wharehouse	12,250	25.0	gpd/1000sf	3	306	0.2	0.6
Total Buiding A					**1,943**		**3.9**
Building B - Office	6,000	0.4	per sf	3	2,400	1.7	5.1
Building B - Wharehouse	17,000	25.0	gpd/1000sf	3	425	0.3	0.9
Total Buiding B					**2,825**		**6.0**
Project Total					**4,768**		**10**

Project: Corporate Center at DC Ranch
Project Number: LGEC066
City: Scottsdale

PROJECTED MAXIMUM SANITARY SEWER LOADS

Lot Number	Proposed Land Use	Gross Area	Gross Area	Average Daily Flow (gpd) per Gross Area Unit Figure 5.1 Average Daily Flow by Land Use	Average Daily Flow (ADF)	Average Daily Flow (ADF)	Peak Daily Flow (PDF) (ADF*4.0)	Peak Daily Flow (PDF) (ADF*4.0)
		sf	ac		gpd	gpm	gpd	gpm
North Sewer Section								
1	Commercial	54,431	1.25	3,000 per ac	3,749	2.6	14,995	10.4
2	Commercial	49,274	1.13	3,000 per ac	3,394	2.4	13,574	9.4
3	Commercial	38,247	0.88	3,000 per ac	2,634	1.8	10,536	7.3
4	Commercial	62,026	1.42	3,000 per ac	4,272	3.0	17,087	11.9
5	Commercial	52,245	1.20	3,000 per ac	3,598	2.5	14,393	10.0
6	Commercial	45,076	1.03	3,000 per ac	3,104	2.2	12,418	8.6
15	Commercial	38,289	0.88	3,000 per ac	2,637	1.8	10,548	7.3
							Sub Total	**65.0**
South Sewer Section								
7	Commercial	51,727	1.19	3,000 per ac	3,562	2.5	14,250	9.9
8	Commercial	56,072	1.29	3,000 per ac	3,862	2.7	15,447	10.7
9	Commercial	31,380	0.72	3,000 per ac	2,161	1.5	8,645	6.0
10	Commercial	29,986	0.69	3,000 per ac	2,065	1.4	8,261	5.7
11	Commercial	29,921	0.69	3,000 per ac	2,061	1.4	8,243	5.7
12	Commercial	45,889	1.05	3,000 per ac	3,160	2.2	12,642	8.8
13	Commercial	146,191	3.36	3,000 per ac	10,068	7.0	40,273	28.0
14	Commercial	66,053	1.52	3,000 per ac	4,549	3.2	18,196	12.6
16	Commercial	136,268	3.13	3,000 per ac	9,385	6.5	37,539	26.1
17	Commercial	153,341	3.52	3,000 per ac	10,561	7.3	42,243	29.3
							Sub Total	**142.9**
Lot 18								
18	Commercial	638,681	14.66	3,000 per ac	43,986	30.5	175,945	122.2
							Sub Total	**122.2**
							TOTAL	**330.0**

8" d/D = 2/3 @ 0.35%
Worksheet for Circular Channel

Project Description	
Worksheet	8" d/D = 2/3 @ 0.35
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.35	%
Depth	0.33	ft
Diameter	8.0	in

Results			
Discharge	157.71	gpm	>60 gpm
Flow Area	0.2	ft²	
Wetted Perime	1.04	ft	
Top Width	0.00	ft	
Critical Depth	0.28	ft	
Percent Full	49.5	%	
Critical Slope	0.66	%	
Velocity	2.04	ft/s	
Velocity Head	0.06	ft	
Specific Energy	0.39	ft	
Froude Number	0.71		
Maximum Disc	345.15	gpm	
Discharge Full	320.85	gpm	
Slope Full	0.08	%	
Flow Type	Subcritical		

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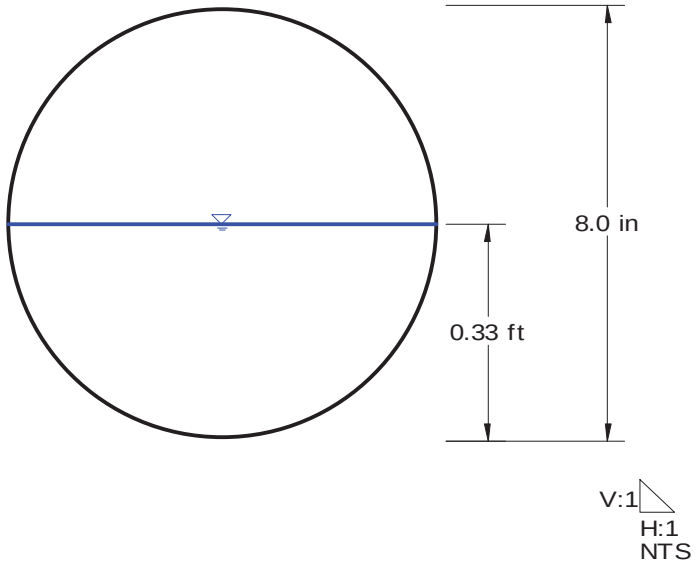
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

8" d/D=2/3 S=0.35
Cross Section for Circular Channel

Project Description	
Worksheet	8" d/D = 2/3 @ 0.35
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data		
Mannings Coefficient	0.013	
Channel Slope	0.35	%
Depth	0.33	ft
Diameter	8.0	in
Discharge	57.71	gpm



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8" Full Capacity @ 0.35%
Worksheet for Circular Channel

Project Description	
Worksheet	8" Full @ 0.35%
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.35	%
Depth	0.66	ft
Diameter	8.0	in

Results			
Discharge	334.32	gpm	>60 gpm
Flow Area	0.3	ft²	
Wetted Perime	1.96	ft	
Top Width	0.00	ft	
Critical Depth	0.41	ft	
Percent Full	99.0	%	
Critical Slope	0.79	%	
Velocity	2.14	ft/s	
Velocity Head	0.07	ft	
Specific Energy	0.73	ft	
Froude Numbe	0.23		
Maximum Disc	345.15	gpm	
Discharge Full	320.85	gpm	
Slope Full	0.38	%	
Flow Type	Subcritical		

Project Engineer: Hunter
FlowMaster v7.0 [7.0005]
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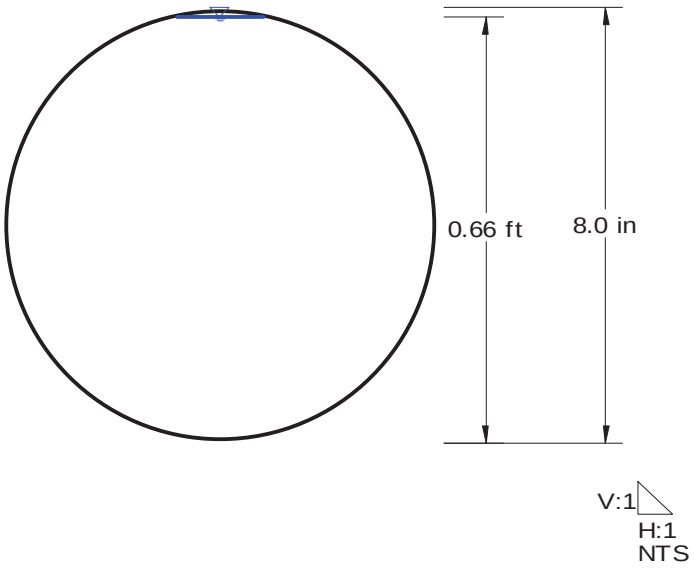
11/02/20

8" Full Capacity @ 0.35%
Cross Section for Circular Channel

Project Description	
Worksheet	8" Full @ 0.35%
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data		
Mannings Coefficient	0.013	
Channel Slope	0.35	%
Depth	0.66	ft
Diameter	8.0	in
Discharge	334.32	gpm



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6" Full Capacity @ 1.1%
Worksheet for Circular Channel

Project Description	
Worksheet	6" Full @ 1.1%
Flow Element	Circular Chann
Method	Manning's For
Solve For	Discharge

Input Data		
Mannings Coeffic	0.013	
Channel Slope	1.10	%
Depth	0.50	ft
Diameter	6.0	in

Results		
Discharge	264.12	gpm
Flow Area	0.2	ft²
Wetted Perime	1.57	ft
Top Width	0.00	ft
Critical Depth	0.39	ft
Percent Full	100.0	%
Critical Slope	1.21	%
Velocity	3.00	ft/s
Velocity Head	0.14	ft
Specific Energy	0.64	ft
Froude Numbe	0.00	
Maximum Disc	284.12	gpm
Discharge Full	264.12	gpm
Slope Full	1.10	%
Flow Type	Subcritical	

>10 gpm

Project Engineer: Hunter
FlowMaster v7.0 [7.0005]
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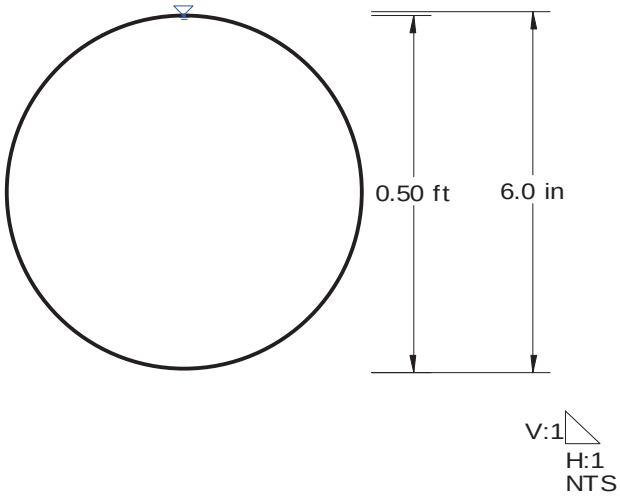
23-DR-2020
11/02/20

6" Full Capacity @ 1.1%
Cross Section for Circular Channel

Project Description	
Worksheet	6" Full @ 1.1%
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data		
Mannings Coefficient	0.013	
Channel Slope	1.10	%
Depth	0.50	ft
Diameter	6.0	in
Discharge	264.12	gpm



Project Engineer: Hunter
FlowMaster v7.0 [7.0005]
Page 1 of 1

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37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

APPENDIX C
REFERENCES

LAND USE	DEMAND (gpd)	DESIGN PEAKING FACTOR
Commercial/Retail	0.5 per sq. ft.	3
Office	0.4 per sq. ft.	3
Restaurant	1.2 per sq. ft.	6
High Density Condominium (Condo)	140 per unit	4.5
Resort Hotel (includes site amenities)	380 per room.	4.5
School: without cafeteria	30 per student	6
School: with cafeteria	50 per student	6
Cultural	0.1 per sq. ft.	3
Clubhouse for Subdivision Golf Course	100 per patron x 2 patrons per du per day	4.5
Fitness Center/ Spa/ Health club	0.8 per sq. ft.	3.5

FIGURE 7-1.2 AVERAGE DAY SEWER DEMAND IN GALLONS PER DAY & PEAKING FACTORS BY LAND USE

HYDRAULIC DESIGN 7-1.404

No public SS lines will be less than 8 inches in diameter unless permission is received in writing from the Water Resources Department.

SS lines shall be designed and constructed to give mean full flow velocities equal to or greater than 2.5 fps, based upon Manning's Formula, using an "n" value of 0.013.

To prevent abrasion and erosion of the pipe material, the maximum velocity will be limited to 10 fps at estimated peak flow. Where velocities exceed this maximum figure, submit a hydraulic analysis along with construction recommendations to the Water Resources Department for consideration. In no case will velocities greater than 15 fps be allowed.

Actual velocities shall be analyzed for minimum, average day and peak day design flow conditions for each reach of pipe.

The SS system shall be designed to achieve uniform flow velocities through consistent slopes. Abrupt changes in slope shall be evaluated for hydraulic jump.

The depth to diameter ratio (d/D) for gravity SS pipes 12 inches in diameter and less shall not exceed 0.65 in the ultimate peak flow condition. This d/D ratio includes an allowance for system infiltration and inflow.

The d/D for gravity drains greater than 12 inches diameter shall not exceed 0.70 for the ultimate peak flow condition. This d/D includes an allowance for system infiltration and inflow.

Measures to mitigate hydrogen sulfide shall be analyzed at manhole drops, abrupt changes in pipe slope or direction and at changes in pipe diameter.

MANHOLES AND CLEAN OUTS 7-1.405

Manholes in city streets shall be located near the center of the inside traffic lane, rather than on or near the line separating traffic lanes. Manholes shall not be in bike trails, equestrian trails, sidewalks, crosswalks or wash crossings. Manholes are required at all

Figure 11 - Water and Wastewater Design Flows

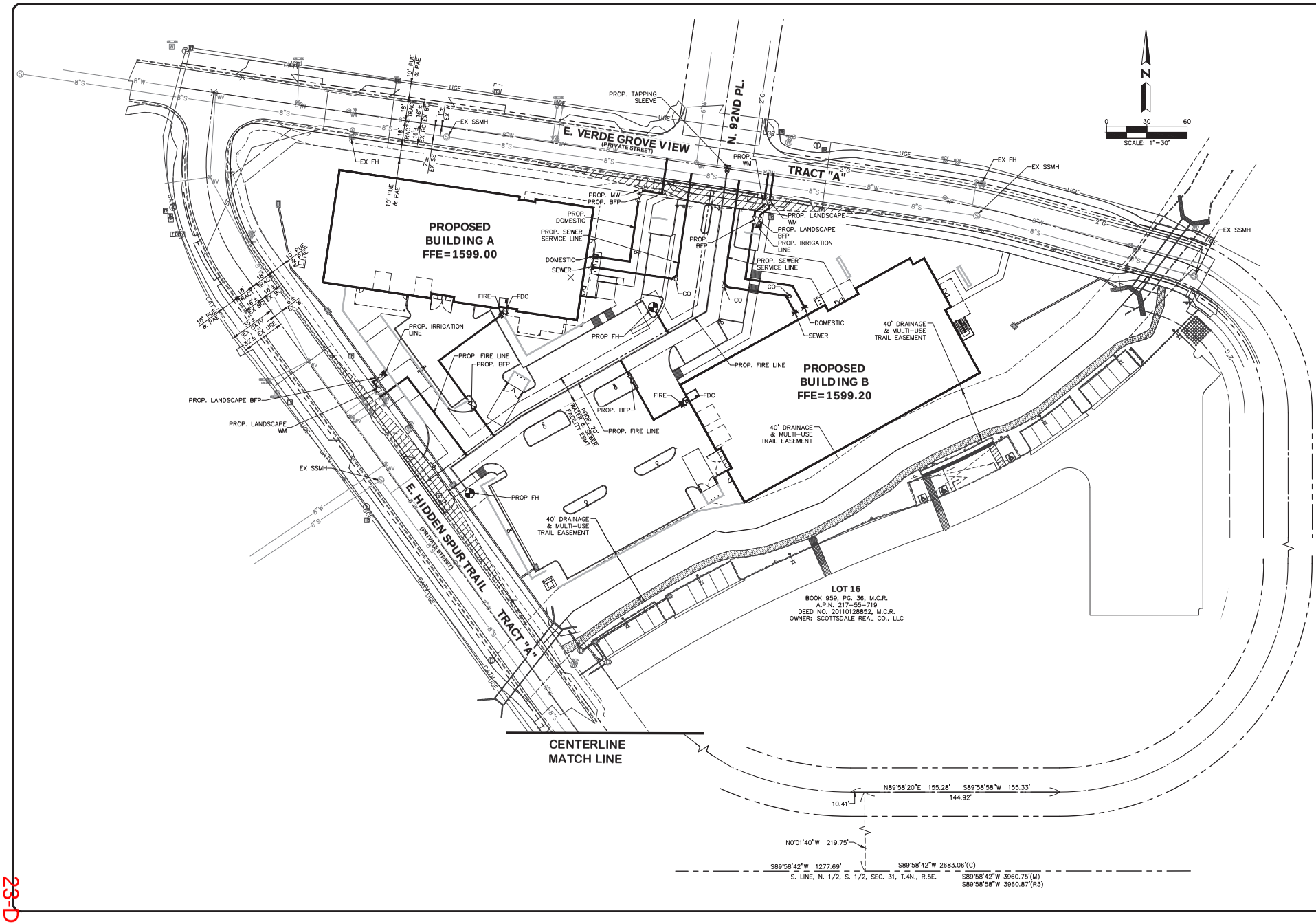
Land Use	Unit	Water Average Daily Flow/Unit (gal)	Wastewater Average Daily flow/Unit (gal)
Single Family Residential	Dwelling	360	240
Multi-family	Dwelling	240	180
Commercial (retail/mall)	1000 ft^2	125	75
Commercial (office)	1000 ft^2	115	90
Warehousing/Big Box Retail	1000 ft^2	30	25
Industrial	1000 ft^2	65	50
Schools	Student	25	20
Hotel (no restaurant)	Room	140	100
Hotel (with restaurant)	Room	200	150
Resort	Room	300	210
Hospital (all flows)	Bed	500	300
Landscape Water Requirements			
General Landscaping	Acre	4,374	N/A
Public Right of Way or Streetscape	Acre	1,339	N/A
Surface Water	Acre	5,335	N/A

NOTES: The following Italicized notes are for Figure 11, Water and Wastewater Design Flows

*Complete design flows are not provided for **industrial and hospital facilities** because case-by-case evaluation is necessary due to varying water demands observed for these use types. Some industrial uses such as data warehouses, food processing, bottling plants, and semi-conductor manufacturing can use more than ten times as much water as compared to warehousing or dry assembly manufacturing with no cooling tower use. Water use in hospitals varies greatly depending upon cooling tower and boiler use, the extent to which the hospital is used as a research and teaching facility, the amount of out-patient versus in-patient services provided, and the types of equipment used. Estimates of anticipated water use and wastewater generation must be produced for each new development or major expansion using projections of demands taking into account the following types of categories:*

- ***Water for cooling towers**: Cooling towers use can make up more than fifty percent of water demand at industrial facilities having large refrigeration units or cooling of servers. In most cases, cooling towers use twenty to forty percent of the water requirements for industrial operations and hospitals.*
- ***Water used as an input for production**: In some manufacturing operations, water is used as an input in the manufacturing process and must be included in demand projections because of the large volumes used. Examples include ice-making, soft-drink or water bottling operations, and food manufacturing such as industrial bakeries.*
- ***Water used in production/activities**: In many manufacturing operations water is used for cooling, cleaning, or other operational activities and must be included in demand projections. Examples include metal forming and finishing, semi-conductor wafer production, and aerospace parts manufacturing. Processes employing newer technologies tend to use less water than older technologies, but estimates must be made on a location and process-specific basis. Some medical facilities are now using the newer medical imaging techniques and sterilization processes that use little or no water, while some medical equipment still requires significant amounts of water.*
- ***Bed to space ratios and mix of services**: Bed to space ratios and services provided in hospitals can vary greatly. These variations depend upon the proportion of space necessary to provide 24/7 nursing care, full linen service, and full food service to patients staying overnight. Furthermore, some hospitals are highly specialized and focus on particular types of treatment and/or research while others provide general and emergency services only. Water use on a per-square-foot or per-bed-basis can even vary significantly between different parts of hospitals, so large expansions will require an individual analysis.*

APPENDIX D
UTILITY PLAN



NO.	DATE	REVISION	BY

PURPOSE: 2ND CITY SUBMITTAL

DESIGN BY: CC
DRAWN BY: CC
CHECKED BY: JO

HUNTER ENGINEERING
CIVIL AND SURVEY
10450 NORTH 74TH STREET, SUITE 200
SCOTTSDALE, AZ 85258
T 480 991 3985
F 480 991 3986

REGISTERED Professional Engineer
36669
JORGE A. ORTIZ
10/21/20
ARIZONA U.S.A.

CONCEPTUAL UTILITY PLAN FOR DC RANCH LOT 15/FETZER 9217 E. VERDE GROVE VIEW SCOTTSDALE, ARIZONA 85255

CONTACT ARIZONA 811 AT LEAST 2 FULL WORKING DAYS BEFORE YOU BEGIN EXCAVATION
ARIZONA811
CALL 811 OR CLICK ARIZONA811.COM

THESE PLANS ARE NOT APPROVED FOR CONSTRUCTION WITHOUT AN APPROVED SIGNATURE FROM THE GOVERNING MUNICIPALITY.

PROJECT NAME: DC RANCH LOT 15/FETZER

HE NO.: LGEC275
SCALE: 1"=30'

SHEET: C3

3 OF 3

23-DR-2020

23-DR-2020
11/02/20

HUNTER

ENGINEERING

CIVIL AND SURVEY

Water Basis of Design Report
For
DC Ranch Lot 15/Fetzer
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Expires 12/31/2019

July 2020

Prepared by:
Hunter Engineering,
10450 North 74th Street
Scottsdale, AZ 852

FINAL Basis of Design Report

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CITY OF SCOTTSDALE

SCOTTSDALE WATER

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For questions or clarifications contact the Water Resources Planning and Engineering Department at 480-312-5685.

BY scan DATE 8/7/2020

Date Approved 8/7/20

23-DR-2020
7/27/2020

WATER BASIS OF DESIGN REPORT
FOR

DC RANCH LOT 15/FETZER

9217 E. VERDE GROVE VIEW
SCOTTSDALE, ARIZONA 85255

PREPARED FOR

LGE DESIGN BUILD
1200 NORTH 52ND STREET
PHOENIX, AZ 85008

PREPARED BY

JORGE ORTIZ, P.E.
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10450 NORTH 74TH STREET, #200
SCOTTSDALE, AZ 85258
(480) 991-3985

JULY 2020
H.E. PROJECT NO. LGEC275

HUNTER
ENGINEERING

TABLE OF CONTENTS

1.0 INTRODUCTION

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This development project is located south of Verde Grove View and east of Hidden Spur Trail within the City of Scottsdale, Maricopa County, Arizona. The proposed project is located within an existing undeveloped site. The existing parcel is bound by Verde Grove View to the north, a commercial development to the south and Hidden Spur Trail to the West Corporate Center at DC Ranch. The site is specifically located in section 34, Township 4 North, Range 5 East, of the Gila and Salt River Base and Meridian. Figure 1, in Appendix A, illustrates the location of the project site in relation to the City of Scottsdale street system. Access to the site is provided from Verde Grove View.

The development proposes the construction of two new buildings. Site improvements will include construction of driveway entrances, a parking lot, sidewalk/hardscape, landscape areas, and supporting infrastructure including new storm water drainage system, water, sewer and fire line service. The overall project site is approximately 3.62 ac.

2.0 EXISTING CONDITIONS

There is an existing 8-inch DIP water main located on Verde Grove View and loops around 93rd street and Hidden Spur Trail.

3.0 PROPOSED WATER DISTRIBUTION SYSTEM

A new private on-site 10-inch fireline loop will be constructed to provide service to the proposed onsite fire hydrants and building fire sprinkler system. This new private fireline will tie into the 8-inch public water line in Verde Grove View and the 8-inch public water line in Hidden Spur Trail. The buildings fire sprinkler system lines will tie into this private fireline loop. See Utility Plans in Appendix E.

Figure 6.1-2 in the City of Scottsdale *Design Standards & Policies Manual* was used to calculate the Average Day Water Demand (ADWD). Per Table 6.1-2, 0.6 gallons per day (gpd) per square feet for office total use and 1,027 gpd per acre for industrial total use. The Maximum Day Demand is 2.0 times the ADD, and the Peak Hour Demand (PHD) is 3.5 times the ADD. See Appendix B for a summary of these calculations.

The proposed Building A will be 16,344 square feet, and Building B is 23,460 square feet. Both buildings will type V-B construction. Per the 2006 International Fire Code, the minimum

base fire flow rate for a building A of this size and construction type is 3,500 gallons per minute (GPM) and 4,250 GPM for building B. Because this building will be protected by an approved sprinkler system, per NFPA 13, the required fire flow may be reduced by half, but not below 1,500 GPM. A fire flow of 2,125 GPM is used for the site analysis. Per City of Scottsdale, pressure requirements, minimum acceptable design pressures are 30 psi at the hydrant under design fire flow requirements and minimum residual pressure 50 psi at highest finished floor for domestic demand. The required and the calculated fire flows are tabulated below.

Building	Construction Type	Building Area (sf)	Minimum Required Fire Flow for Buildings Table B105.1 2006 International Fire Code		Min Fire Flow w/ 50% Sprinkler Reduction	Lowest Available Pressure (psi)	Model Node
Building A	V-B	16,344	3,500	gpm	1,750	50.50	J-6
Building B	V-B	23,460	4,250	gpm	2,125	50.50	J-6

A fire flow test was completed on July 16, 2020, by Arizona Flow Testing, LLC. This test data was used to model the proposed system using WaterCad, a pipe network analysis program by Haestad Methods. A reservoir and pump was added to the model near the flow test location to simulate pressure versus flow curve. Note that the pipes PX-1 and PX-2 connecting the pumps and reservoirs are not a part of the system and are oversized to 120-inches to minimize system losses. Pipes and junctions were added to the network model matching the pipe sizes, materials and elevations of the proposed and existing system.

The fire flow model was set up such that full fire flow demand was taken out of the most remote onsite fire hydrants (J-3, J-8). The lowest resultant pressure based upon the required fire flow was calculated to be 50.41 psi, at J-6. Results and data from the WaterCAD is shown in Appendix B.

4.0 CONCLUSIONS

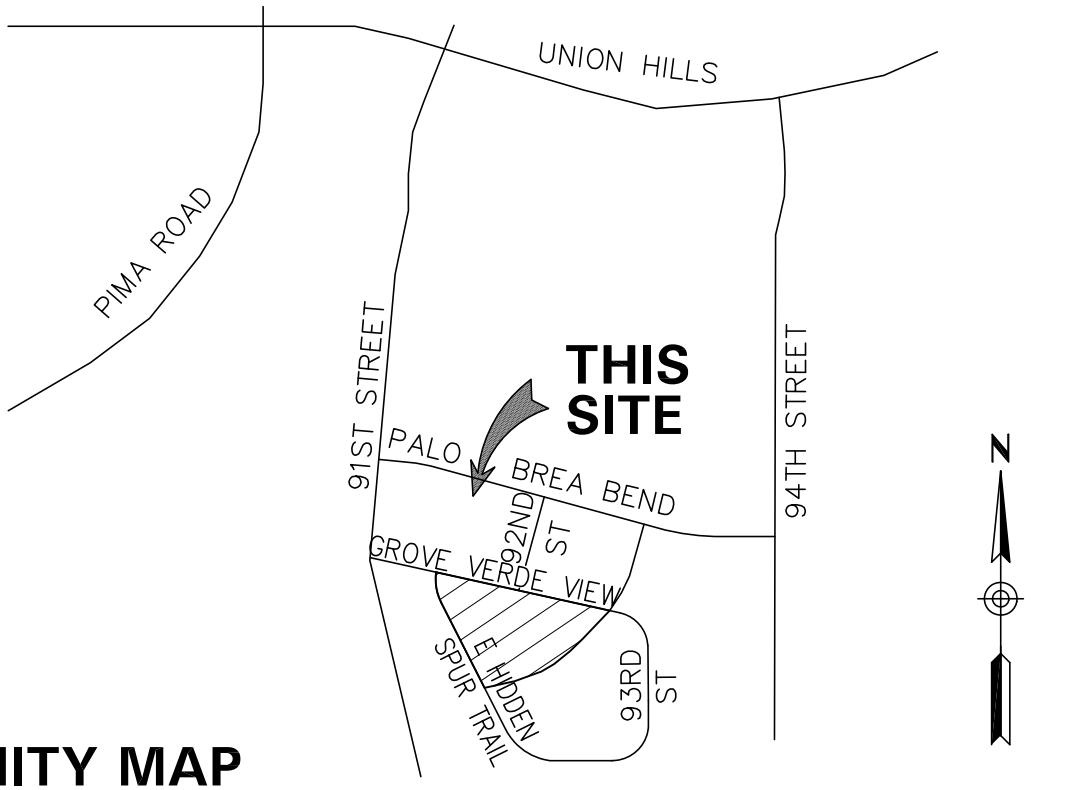
Based on the results of this study, it can be concluded that:

- The existing public water system is adequate to support this development.

5.0 REFERENCES

1) City of Scottsdale Design Standard & Policies Manual, January 2018.

APPENDIX A
FIGURES



VICINITY MAP

NTS

APPENDIX B
CALCULATIONS AND DATA SHEET

Project:	DC Ranch-Lot15/Fetzer	7/23/2020
Project Number:	LGEC275	
City:	Scottsdale	
Area Building:	3.62 AC	

DOMESTIC DEMAND SUMMARY *(PER CITY OF SCOTTSDALE DESIGN STANDARD AND POLICIES MANUAL, JULY 2018)*

Site	Site Use	Building Area (sf)	Average Day Demand (gpd) Gross Bldg Area (sf) per Table 6-1.2 Average Day Water Demands	Average Day Demand (ADD) (gpd)	Max Day Demand (MDD) (ADD*2.0) (gpd)	Average Day Demand (ADD) (gpm)	Max Day Demand (MDD) (ADD*2.0) (gpm)	Peak Hour Demand (PHD) (ADD*3.5) (gpm)
Building A	Office	4,092.00	0.6 per sf	2,455	4,910	1.7	3.4	6.0
Building B	Office	6,000.00	0.6 per sf	3,600	7,200	2.5	5.0	8.8

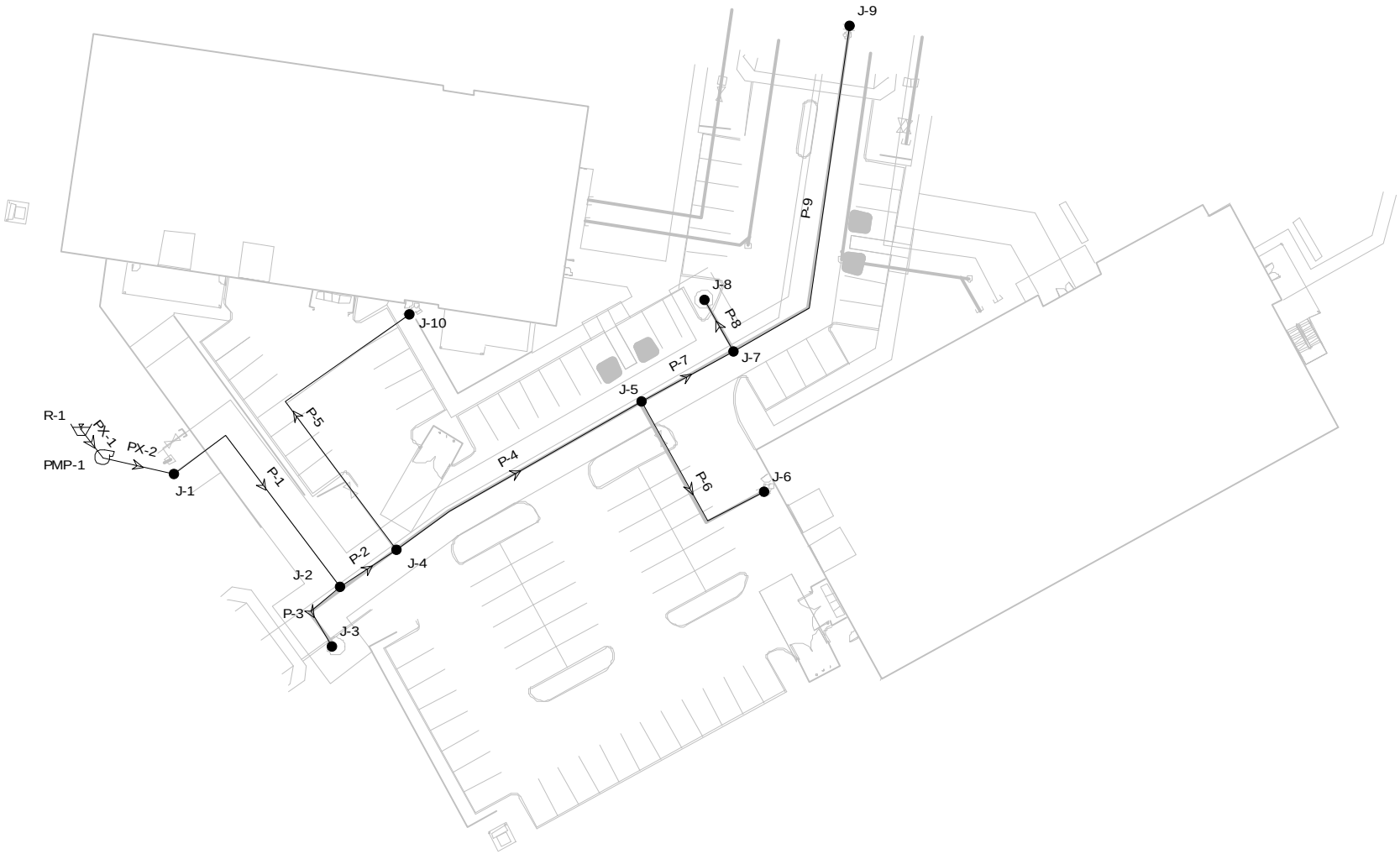
Site	Site Use	Site Area (ac)	Average Day Demand (gpd) per Net Site Area per Table 6-1.2 Average Day Water Demands	Average Day Demand (ADD) (gpd)	Max Day Demand (MDD) (ADD*2.0) (gpd)	Average Day Demand (ADD) (gpm)	Max Day Demand (MDD) (ADD*2.0) (gpm)	Peak Hour Demand (PHD) (ADD*3.5) (gpm)
Building A	Industrial	0.28	1,027.0 per acre	288	575	0.2	0.4	0.7
Building B	Industrial	0.39	1,027.0 per acre	401	801	0.3	0.6	1.0
			Total:	**6,743**	**13,487**	**4.7**	**9.4**	**16.4**

FIRE FLOW SUMMARY

Building	Construction Type	Building Area (sf)	Minimum Required Fire Flow for Buildings Table B105.1 2006 International Fire Code	Min Fire Flow w/ 50% Sprinkler Reduction	Lowest Available Pressure (psi)	Model Node	Sprinkler Reduction Required	Building Sprinklered
Building A	V-B	16,344	3,500 gpm	1,750.0	50.50	J-6	YES	YES
Building B	V-B	23,460	4,250 gpm	2,125.0	50.50	J-6		
	Total:	39,804						

* Minimum acceptable design pressures are 40 psi under Peak Hour demands and 20 psi under Max Day + Fire Flow demands.

Scenario: Fire



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Scenario: Peak
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Discharge (gpm)	Velocity (ft/s)
PX-1	1.00	120.0	Ductile Iron	130.0	16.41	0.00
PX-2	1.00	120.0	Ductile Iron	130.0	16.41	0.00
P-1	97.00	8.0	Ductile Iron	130.0	16.41	0.10
P-2	25.00	8.0	Ductile Iron	130.0	16.41	0.10
P-4	110.00	8.0	Ductile Iron	130.0	16.40	0.10
P-7	40.00	8.0	Ductile Iron	130.0	16.40	0.10
P-6	76.00	8.0	Ductile Iron	130.0	0.00	0.00
P-5	129.00	8.0	Ductile Iron	130.0	0.00	0.00
P-9	143.00	8.0	Ductile Iron	130.0	0.00	0.00
P-3	31.00	8.0	Ductile Iron	130.0	-0.00	0.00
P-8	23.00	8.0	Ductile Iron	130.0	-0.00	0.00

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Scenario: Peak
Steady State Analysis
Junction Report

Label	Elevation (ft)	Type	Base Flow (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,588.25	Demand	0.00	1,763.80	75.95
J-2	1,588.59	Demand	0.00	1,763.80	75.81
J-3	1,588.33	Demand	0.00	1,763.80	75.92
J-4	1,589.08	Demand	0.00	1,763.80	75.59
J-5	1,591.95	Demand	0.00	1,763.80	74.35
J-6	1,594.20	Demand	0.00	1,763.80	73.38
J-7	1,592.05	Demand	16.40	1,763.80	74.31
J-8	1,592.00	Demand	0.00	1,763.80	74.33
J-9	1,591.05	Demand	0.00	1,763.80	74.74
J-10	1,593.00	Demand	0.00	1,763.80	73.90

>50psi OK

Scenario: Fire
Steady State Analysis
Junction Report

Label	Elevation (ft)	Type	Base Flow (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,588.25	Demand	0.00	1,720.90	57.39
J-2	1,588.59	Demand	0.00	1,713.71	54.13
J-3	1,588.33	Demand	1,062.50	1,713.08	53.97
J-4	1,589.08	Demand	0.00	1,713.19	53.70
J-5	1,591.95	Demand	0.00	1,710.93	51.48
J-6	1,594.20	Demand	0.00	1,710.93	50.50
J-7	1,592.05	Demand	4.70	1,710.10	51.08
J-8	1,592.00	Demand	1,062.50	1,709.63	50.89
J-9	1,591.05	Demand	0.00	1,710.10	51.51
J-10	1,593.00	Demand	0.00	1,713.19	52.00

>30psi OK

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Scenario: Static
Steady State Analysis
Junction Report

Label	Elevation (ft)	Type	Base Flow (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,588.25	Demand	0.00	1,763.81	75.96
J-2	1,588.59	Demand	0.00	1,763.81	75.81
J-3	1,588.33	Demand	0.00	1,763.81	75.92
J-4	1,589.08	Demand	0.00	1,763.81	75.60
J-5	1,591.95	Demand	0.00	1,763.81	74.36
J-6	1,594.20	Demand	0.00	1,763.81	73.38
J-7	1,592.05	Demand	0.00	1,763.81	74.31
J-8	1,592.00	Demand	0.00	1,763.81	74.33
J-9	1,591.05	Demand	0.00	1,763.81	74.75
J-10	1,593.00	Demand	0.00	1,763.81	73.90

~76psi Model Test Matches Hydrant Test

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Scenario: Residual
Steady State Analysis
Junction Report

Label	Elevation (ft)	Type	Base Flow (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,588.25	Demand	1,682.00	1,736.09	63.96
J-2	1,588.59	Demand	0.00	1,736.09	63.82
J-3	1,588.33	Demand	0.00	1,736.09	63.93
J-4	1,589.08	Demand	0.00	1,736.09	63.60
J-5	1,591.95	Demand	0.00	1,736.09	62.36
J-6	1,594.20	Demand	0.00	1,736.09	61.39
J-7	1,592.05	Demand	0.00	1,736.09	62.32
J-8	1,592.00	Demand	0.00	1,736.09	62.34
J-9	1,591.05	Demand	0.00	1,736.09	62.75
J-10	1,593.00	Demand	0.00	1,736.09	61.91

~64psi Model Test Matches Hydrant Test

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Scenario: Calculated
Steady State Analysis
Junction Report

Label	Elevation (ft)	Type	Base Flow (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,588.25	Demand	3,863.00	1,634.53	20.02
J-2	1,588.59	Demand	0.00	1,634.53	19.87
J-3	1,588.33	Demand	0.00	1,634.53	19.99
J-4	1,589.08	Demand	0.00	1,634.53	19.66
J-5	1,591.95	Demand	0.00	1,634.53	18.42
J-6	1,594.20	Demand	0.00	1,634.53	17.45
J-7	1,592.05	Demand	0.00	1,634.53	18.38
J-8	1,592.00	Demand	0.00	1,634.53	18.40
J-9	1,591.05	Demand	0.00	1,634.53	18.81
J-10	1,593.00	Demand	0.00	1,634.53	17.97

~20psi Model Test Matches Hydrant Test

Detailed Report for Pump: PMP-1

Scenario Summary	
Scenario	Peak
Active Topology Alternative	Base-Active Topology
Physical Alternative	Base-Physical
Demand Alternative	Base-Demand
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow
Capital Cost Alternative	Base-Capital Cost
Energy Cost Alternative	Base-Energy Cost
User Data Alternative	Base-User Data

Global Adjustments Summary			
Demand	<None>	Roughness	<None>

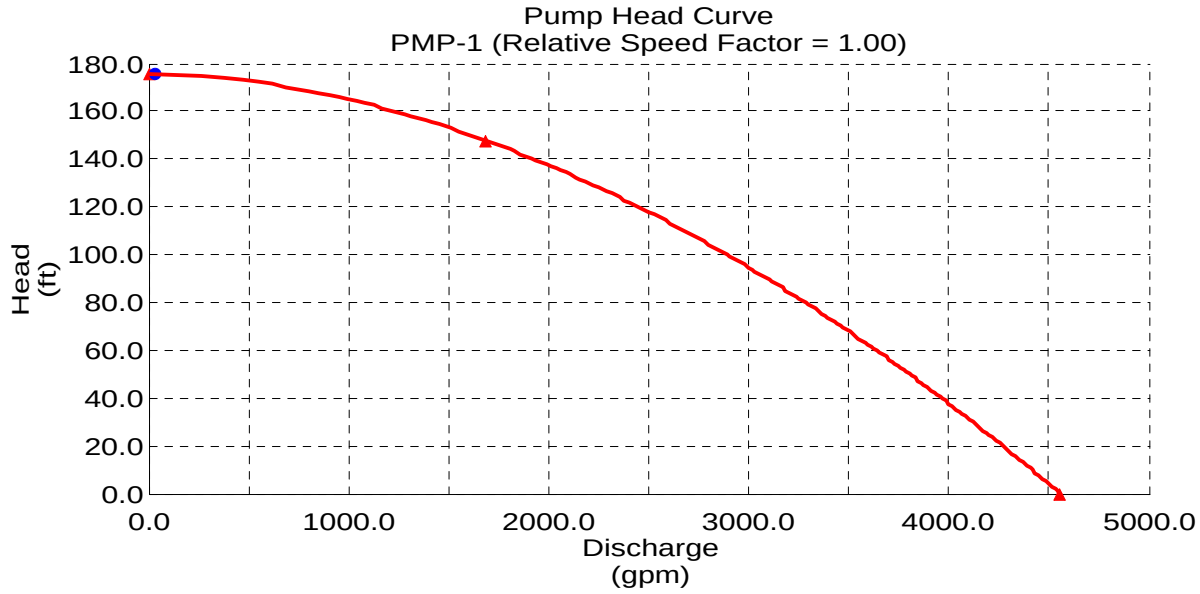
Geometric Summary			
X	709,885.22 ft	Upstream Pipe	PX-1
Y	962,341.59 ft	Downstream Pipe	PX-2
Elevation	1,588.25 ft		

Pump Definition Summary	
Pump Definition	Default Pump Definition

Initial Status			
Initial Pump Status	On	Initial Relative Speed Facto	1.00

Calculated Results Summary

Time (hr)	Control Status	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Discharge (gpm)	Pump Head (ft)	Relative Speed	Calculated Water Power (Hp)
0.00	On	,588.25	1,763.79	32.81	75.54	1.00	1.45



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APPENDIX C
FIRE HYDRANT FLOW TEST

Arizona Flow Testing LLC

HYDRANT FLOW TEST REPORT

Project Name:	Fetzer/Lot 15
Project Address:	9217 East Verde Grove View, Scottsdale, Arizona 85255
Client Project No.:	LGEC275
Arizona Flow Testing Project No.:	20258
Flow Test Permit No.:	C62628
Date and time flow test conducted:	July 16, 2020 at 6:15 AM
Data is current and reliable until:	January 16, 2021
Conducted by:	Floyd Vaughan – Arizona Flow Testing, LLC (480-250-8154)
Witnessed by:	Sonny Schreiner –City of Scottsdale-Inspector (602-819-7718)

Raw Test Data

Static Pressure: **76.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **64.0 PSI**
(Measured in pounds per square inch)

Pitot Pressure: **20.0 PSI**
(Measured in pounds per square inch)

Diffuser Orifice Diameter: One 4-inch Hose monster
(Measured in inches)

Coefficient of Diffuser: .7875

Flowing GPM: **1,682 GPM**
(Measured in gallons per minute)

GPM @ 20 PSI: **3,863 GPM**

Data with 10 % Safety Factor

Static Pressure: **68.4 PSI**
(Measured in pounds per square inch)

Residual Pressure: **56.4 PSI**
(Measured in pounds per square inch)

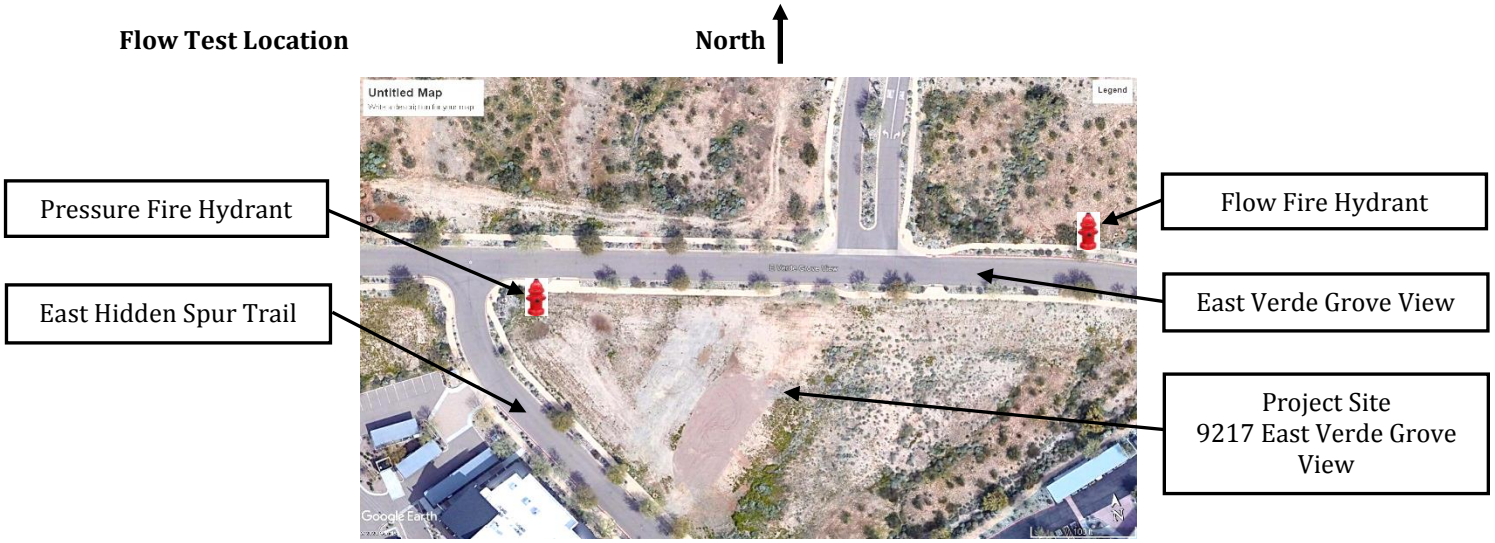
Distance between hydrants: Approx. 500 Feet

Main size: Not Provided

Flowing GPM: **1,682 GPM**

GPM @ 20 PSI**:** **3,571 GPM**

Flow Test Location **North**



APPENDIX D
REFERENCES

d. Pipe flow velocity in feet per second (fps)
e. Each pipe segment's head loss rate (ft. /1,000ft or psi/ft.)
f. PRVs: Upstream and downstream pressures (psi or HGL elevation)
g. Tanks: Inflow and outflow (gpm)
h. Shows all units for the values presented or provide a legend on the diagram page that indicates the units used

AVERAGE DAY WATER DEMANDS [1]							
IN GALLONS PER DAY (GPD) [2]				IN GALLONS PER MINUTE (GPM) [2][3]			
Land Use	Inside Use	Outside Use	Total Use	Inside Use	Outside Use	Total Use	Units
Residential Demand per Dwelling Unit							
< 2 dwelling unit per acre (DU/ac)	208.9	276.7	485.6	0.30	0.39	0.69	per unit
2 – 2.9 DU/ac	193.7	276.7	470.4	0.27	0.39	0.66	per unit
3 – 7.9 DU/ac	175.9	72.3	248.2	0.25	0.11	0.36	per unit
8 – 11.9 DU/ac	155.3	72.3	227.6	0.22	0.11	0.33	per unit
12 – 22 DU/ac	155.3	72.3	227.6	0.22	0.11	0.33	per unit
High Density Condominium (condo)	155.3	30	185.3	0.22	0.05	0.27	per unit
Resort Hotel (includes site amenities)	401.7	44.6	446.3	0.56	0.07	0.63	per room
Service and Employment							
Restaurant	1.2	0.1	1.3	1.67E-03	1.39E-04	1.81E-03	per square foot (sq.ft.)
Commercial/ Retail	0.7	0.1	0.8	9.73E-04	1.39E-04	1.11E-03	per sq.ft.
Commercial High Rise	0.5	0.1	0.6	6.95E-04	1.39E-04	8.34E-04	per sq.ft.

AVERAGE DAY WATER DEMANDS [1]							
IN GALLONS PER DAY (GPD) [2]				IN GALLONS PER MINUTE (GPM) [2][3]			
Office	0.5	0.1	0.6	6.95E-04	1.39E-04	8.34E-04	per sq.ft.
Institutional	670	670	1340	0.94	0.94	1.88	per acre
Industrial	873	154	1027	1.22	0.22	1.44	per acre
Research and Development	1092	192	1284	1.52	0.27	1.79	per acre
Special Use Areas							
Natural Area Open Space	0	0	0	0.0	0.0	0.0	per acre
Developed Open Space – Parks	0	1786	1786	0.0	2.49	2.49	per acre
Developed Open Space – Golf Course	0	4285	4285	0.0	5.96	5.96	per acre

Notes:
(1) These values shall not be used directly for service line or water meter sizing.
(2) Gallon per day values are provided for reference only. The instantaneous gallon per minute flow rates presented are intended for use in the required hydraulic modeling scenarios. The gpm values assume a 12-hour active water use period per 24-hour day. In large or specialty developments or master plans the hydraulic analysis criteria and parameters should be discussed with the Water Resources Department. Seasonal peaking should also be considered. Upon review, the Water Resources Department reserves the right to designate flows to be used in hydraulic modeling scenarios that may be different from those presented here.
(3) The hydraulic modeling peaking factors used in select modeling scenarios are to be applied to the gpm values shown here. Max day and peak hour peaking factors can be found in Section 6-1.404.

FIGURE 6-1.2 AVERAGE DAY WATER DEMANDS

TABLE B105.1(2)
REFERENCE TABLE FOR TABLES B105.1(1) AND B105.2

FIRE-FLOW CALCULATION AREA (square feet)					FIRE-FLOW (gallons per minute)[b]	FLOW DURATION (hours)
Type IA and IB[a]	Type IIA and IIIA[a]	Type IV and V-A[a]	Type IIB and IIIB[a]	Type V-B[a]		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	2
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	3
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	4
145,901-164,200	82,101-92,400	52,501-59,100	37,901-42,700	23,301-26,300	4,250	
164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4,500	
183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4,750	
203,701-225,200	114,601-126,700	73,301-81,100	53,001-58,600	32,601-36,000	5,000	
225,201-247,700	126,701-139,400	81,101-89,200	58,601-65,400	36,001-39,600	5,250	
247,701-271,200	139,401-152,600	89,201-97,700	65,401-70,600	39,601-43,400	5,500	
271,201-295,900	152,601-166,500	97,701-106,500	70,601-77,000	43,401-47,400	5,750	
295,901-Greater	166,501-Greater	106,501-115,800	77,001-83,700	47,401-51,500	6,000	
—	—	115,801-125,500	83,701-90,600	51,501-55,700	6,250	
—	—	125,501-135,500	90,601-97,900	55,701-60,200	6,500	
—	—	135,501-145,800	97,901-106,800	60,201-64,800	6,750	
—	—	145,801-156,700	106,801-113,200	64,801-69,600	7,000	
—	—	156,701-167,900	113,201-121,300	69,601-74,600	7,250	
—	—	167,901-179,400	121,301-129,600	74,601-79,800	7,500	
—	—	179,401-191,400	129,601-138,300	79,801-85,100	7,750	
—	—	191,401-Greater	138,301-Greater	85,101-Greater	8,000	

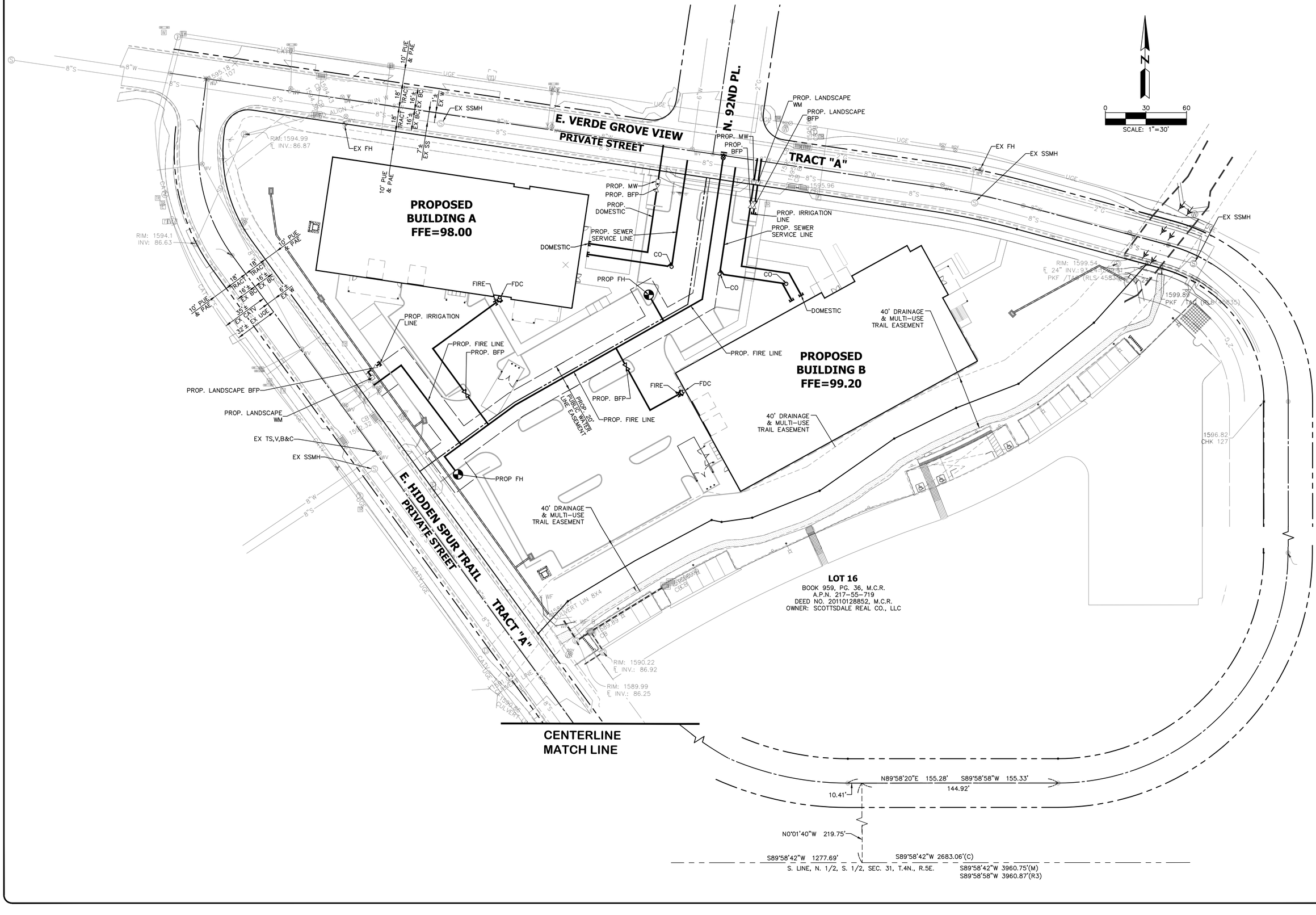
For SI: 1 square foot = 0.0929 m^2, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.
a. Types of construction are based on the *International Building Code*.
b. Measured at 20 psi residual pressure.

TABLE B105.2
REQUIRED FIRE-FLOW FOR BUILDINGS OTHER THAN ONE- AND TWO-FAMILY DWELLINGS, GROUP R-3 AND R-4 BUILDINGS AND TOWNHOUSES

AUTOMATIC SPRINKLER SYSTEM (Design Standard)	MINIMUM FIRE-FLOW (gallons per minute)	FLOW DURATION (hours)
No automatic sprinkler system	Value in Table B105.1(2)	Duration in Table B105.1(2)
Section 903.3.1.1 of the *International Fire Code*	25% of the value in Table B105.1(2)[a]	Duration in Table B105.1(2) at the reduced flow rate
Section 903.3.1.2 of the *International Fire Code*	25% of the value in Table B105.1(2)[b]	Duration in Table B105.1(2) at the reduced flow rate

For SI: 1 gallon per minute = 3.785 L/m.
a. The reduced fire-flow shall be not less than 1,000 gallons per minute.
b. The reduced fire-flow shall be not less than 1,500 gallons per minute.

APPENDIX E
UTILITY PLAN



NO.	DATE	REVISION	BY

PURPOSE: CONCEPTUAL PLAN SET

DESIGN BY: CC
DRAWN BY: CC
CHECKED BY: JO

HUNTER ENGINEERING
CIVIL AND SURVEY
10450 NORTH 74TH STREET, SUITE 200
SCOTTSDALE, AZ 85258
T 480 991 3985
F 480 991 3986

Registered Professional Engineer
CERTIFICATE NO.
36669
JORGE A. ORTIZ
Date Signed 07/27/20
(Civil)

CONCEPTUAL UTILITY PLAN FOR DC RANCH LOT 15/FETZER 9217 E. VERDE GROVE VIEW SCOTTSDALE, ARIZONA 85255

CONTACT ARIZONA 811 AT LEAST 2 FULL WORKING DAYS BEFORE YOU BEGIN EXCAVATION
AR ZONA811 STBLK STAKE, INC. DBA
CALL 811 OR CLICK ARIZONA811.COM

THESE PLANS ARE NOT APPROVED FOR CONSTRUCTION WITHOUT AN APPROVED SIGNATURE FROM THE GOVERNING MUNICIPALITY.

PROJECT NAME: DC RANCH LOT 15/FETZER

HE NO.: LGEC275
SCALE: 1"=30'

SHEET: C3

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