HUNTER
ENGINEERING

CIVIL AND SURVEY

Sewer Basis of Design Report
For
Juggernaut HQ
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 11/16/2021

28-DR-2021

Registered Professional Engineer (Civil)
CERTIFICATE NO.
36669
JORGE A.
ORTIZ
Date Signed 10/21/2021
ARIZONA U.S.A.

October 2021

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

28-DR-2021

28-DR-2021
10/27/2021

SEWER BASIS OF DESIGN REPORT
FOR

JUGGERNAUT HQ

9217 E. VERDE GROVE VIEW
SCOTTSDALE, ARIZONA 85255

PREPARED FOR

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

PREPARED BY

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OCTOBER 2021

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28-DR-2021

H.E. PROJECT NO. LGEC290

Table of Contents

1.0 INTRODUCTION

This sewer basis of design report has been prepared under a contract from LGE Design Build, developer of Juggernaut HQ. 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 (COPWSD) (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 31, 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 one new building. The proposed uses for the building are office, warehouse and light manufacturing. Water will not be used in the manufacturing process. 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 1.82 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. See the 'Utility Plans' in Appendix D for existing sewer main and service stub locations and sizes.

3.0 PROPOSED SEWER COLLECTION SYSTEM

This project proposes to connect to the existing public 8-inch gravity sewer line at Verde Grove View. See the 'Utility Plans' in Appendix D for proposed service stub locations and sizes. Wastewater flows for the proposed site were calculated in accordance with the CSDSPM (Reference 1) and City of Phoenix Water Services Department, Design Standards Manual for Water and Wastewater Systems, 2017 (Reference 2). 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 gpd per sq. ft. and peaking factor of 3 were obtained from the CSDSPM Figure 7.1-2 located in appendix C.

According to Section 7-1.403 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 and manufacturing use are not on Figure 7.1-2. As such the ADSD for these uses was based on Figure 11 of the City of Phoenix Design Standards Manual for Water and Wastewater Systems (2017). See Appendix C. The demands for warehouse use according to Figure 11 is 25 gallons per day per every 1000 sf and the demands for Industrial (manufacturing) is 50 gallons per day every 1000 sf a peaking factor of 3 was used.

According to the calculations provided in Appendix B. The proposed building will have an estimated Average Daily Flow of 6, 251 GPD and a Peak Hour Flow of 12.9 GPM. Refer to Appendix B for pipe capacity calculations for the proposed 6-inch private sewer line and the existing 8- inch public sewer line. The Peak Flow estimated with the Final Master Design Report - Sanitary Sewer (FMDRSS) for Corporate Center at DC Ranch Lot 15 was 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 calculations for the proposed and existing sewer main are as follows:

- Proposed 6-inch service line with 1.1% slope flowing full, the capacity is 264 GPM.
- Existing 8-inch sewer line with 0.52% slope flowing full, the capacity is 391 GPM.

The capacity of the proposed 6-in sewer service line is greater than the estimated Peak Hour Flow of 12.9 GPM generated from Building B.

Maricopa County of Environmental Services Department requires sewer mains to flow with a minimum velocity of 3 feet per second on a 6-inch pipe flowing full and 2.5 feet per second on a 8-inch pipe flowing full. The 6-inch sewer main will need to maintain a minimum slope of 1.1%. The proposed 8-inch sewer main will need to maintain slope of 0.52%. For a summary of the depth calculations, see Appendix 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

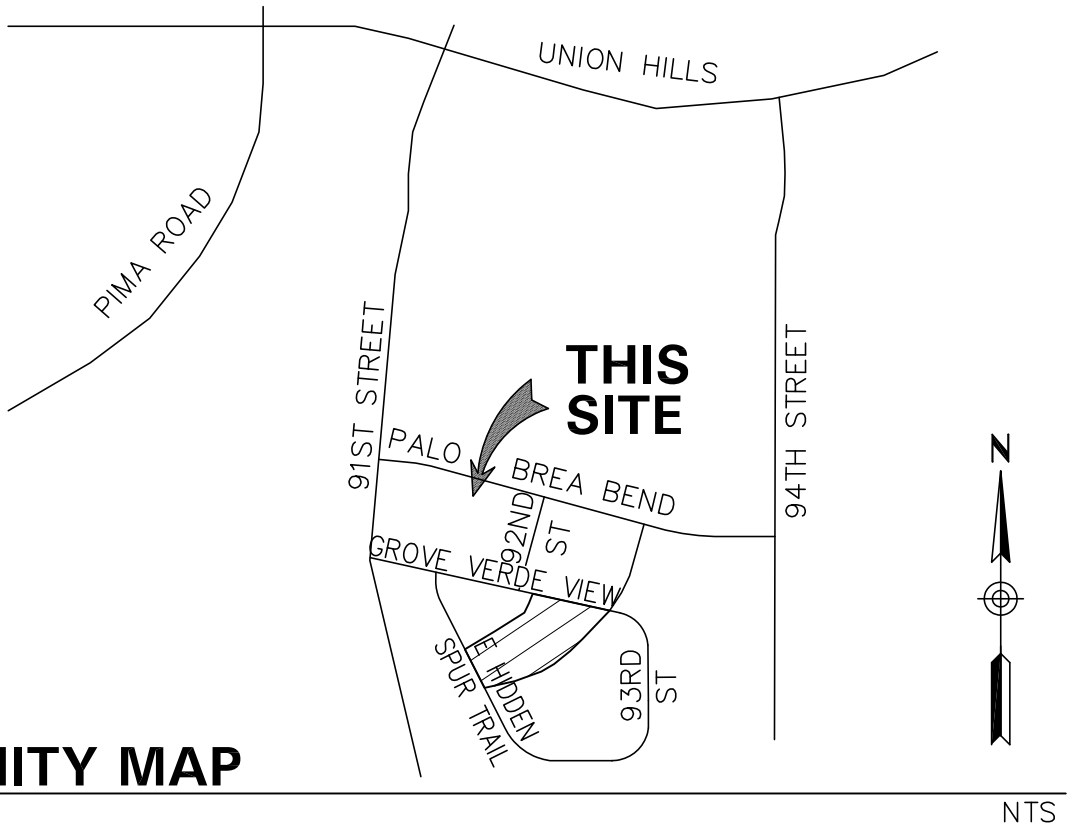
Based on the results of this study, it can be concluded that:

- 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).

APPENDIX A
FIGURES



VICINITY MAP

NTS

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APPENDIX B
SEWER CAPACITY WORK SHEET

Project: Juggernaut HQ
Project No.: LGEC290
City: SCOTTSDALE, AZ
Date: 9/1/2021

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)
Office	14,300	0.4	per sf	3	5,720	4.0	12.0
Wharehouse	7,250	25.0	gpd/1000sf	3	181	0.1	0.3
Manufacturing (Industrial)	7,000	50.0	gpd/1000sf	3	350	0.2	0.6
Total Buiding					**6,251**		**12.9**

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10/27/2021

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	

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28-DR-2021
10/27/2021

8" d/D = 1/2 @ 0.35%
Worksheet for Circular Channel

Project Description	
Worksheet	Full 8" @ 0.52%
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Capacity

Input Data	
Mannings Coefficient	0.013
Channel Slope	0.52 %
Diameter	8.0 in

Results	
Depth	0.67 ft
Discharge	391.09 gpm
Flow Area	0.3 ft²
Wetted Perimeter	2.09 ft
Top Width	0.00 ft
Critical Depth	0.44 ft
Percent Full	100.0 %
Critical Slope	0.86 %
Velocity	2.50 ft/s
Velocity Head	0.10 ft
Specific Energy	0.76 ft
Froude Number	0.00
Maximum Discharge	420.70 gpm
Discharge Full	391.09 gpm
Slope Full	0.52 %
Flow Type	N/A

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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

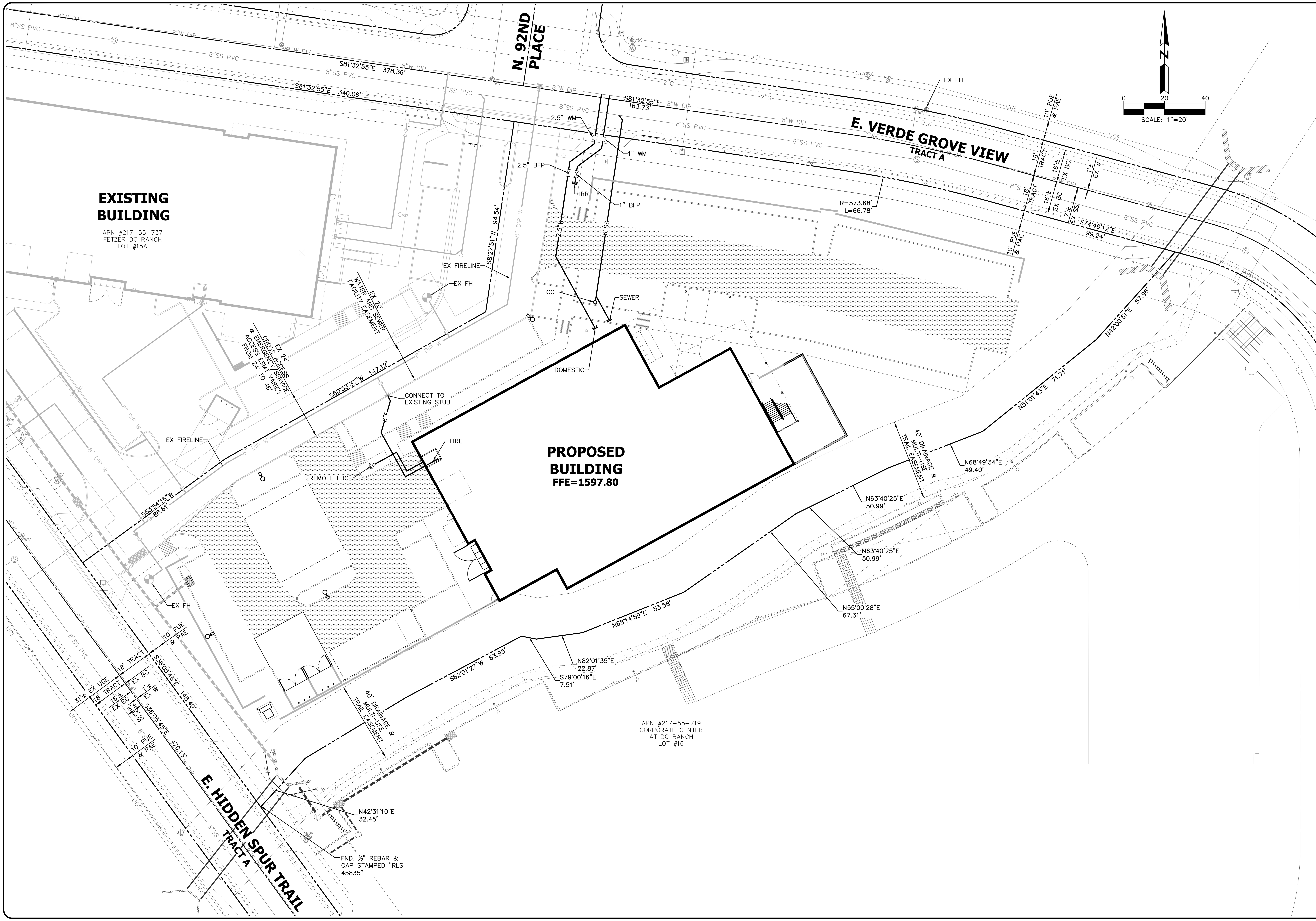
Land Use	Unit	Water Average Daily Flow/Unit (gal)	Wastewater Average Daily flow/Unit (gal)
Single Family Residential	Dwelling	360	240
Multi-family	Dwelling	240	180
Commercial (retail/mall)	1000 ft^2	125	75
Commercial (office)	1000 ft^2	115	90
Warehousing/Big Box Retail	1000 ft^2	30	25
Industrial	1000 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:
1ST CONCEPTUAL SUBMITTAL

DESIGN BY: RJM
DRAWN BY: RJM
CHECKED BY: JAO

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F 480 991 3986

Registered Professional Engineer
CERTIFICATE NO. 36669
JORGE A. ORTIZ
ARIZONA, U.S.A.
Date Signed 09/10/21

CONCEPTUAL UTILITY PLAN FOR JUGGERNAUT HQ
9217 E. VERDE GROVE
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:
JUGGERNAUT HQ

HE NO.: LGEC290
SCALE: 1"=20'

SHEET:
C3