KLAND CIVIL ENGINEERS

Preliminary Water & Sewer Basis of Design Report

Megerdichian Assisted Seniors Center (MASC)

8849 E CHOLLA ST, SCOTTSDALE, AZ 85260
25-ZN-2018

Kland# K15153

Prepared for:

AAk Architecture & Interiors, Inc.
7585 E. Redfield Rd., Suite 106
Scottsdale, AZ 85260-6937
Contact: Artin Knadjian

Prepared by:

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Submitted to:

City of Scottsdale
7447 E. Indian School Road
Scottsdale, Arizona 85251

Revised December 8, 2020
Revised September 11, 2020
August 24, 2018

Table of Contents

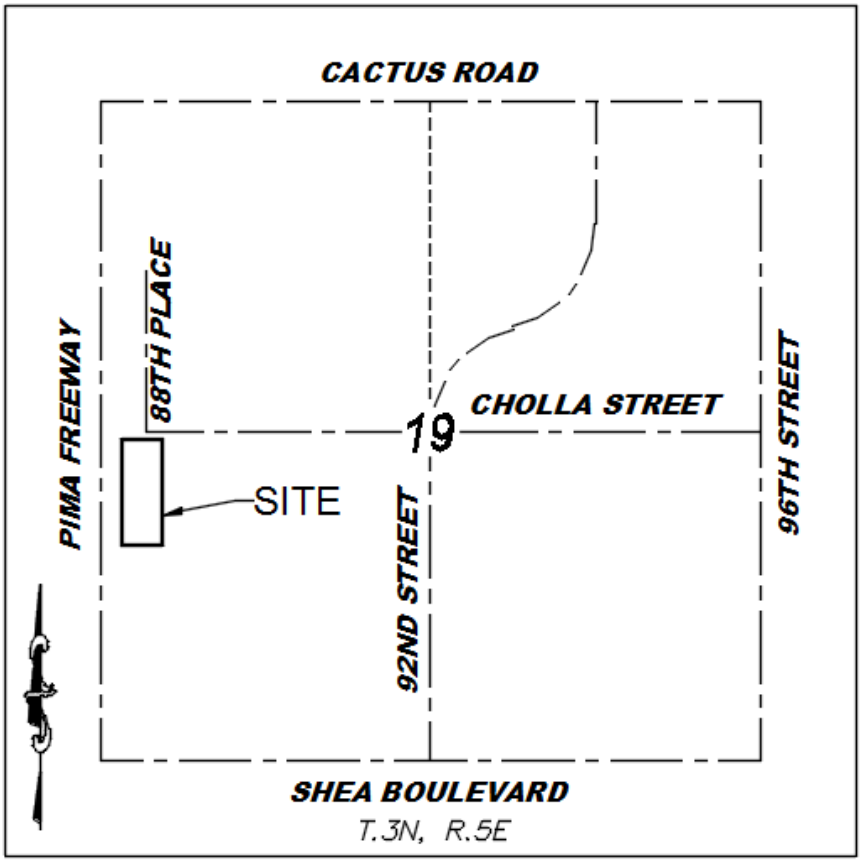
Appendix

Revised December 8, 2020
Revised September 11, 2020
August 24, 2018

1. Introduction

The Megerdichian Assisted Seniors Center (MASC) is located within a portion of Lot 3 in the Southwest Quarter of Section 19, Township 3 North, Range 5 East of Gila and Salt River base and Meridian, Maricopa County, Arizona. The site is bordered on the west by Pima Freeway, on north by Cholla Street, and on the east and south by previously developed properties. The current zoning of the site is R1-35 according to Maricopa County Assessor's Office. Currently, the site includes several parking lots and paved driveways, three single story buildings which are connected by a dirt road, and a retention area. The remaining portion on the north of the site is open space area which the proposed development will occur on. The proposed development includes a 78 unit senior center building (92,436 sf), and the required parking spaces.

Please see Vicinity Map below.



VICINITY MAP
N.T.S.

An existing 30" DIP public water and 24" PVC public sewer are located along the west property boundary. Please refer to "Appendix C – Sewer and Water Quarter Section Map" for detailed information.

2. Water System

With respect to the water line design, it is planned to service the new building by connecting the new water line to the existing 8" ACP water line along Cholla Street by replacing the existing 6" connection with an 8" connection. The new 8" public waterline will be looped through the site and connect back to the 6" public water line on the west side of the site. The new building domestic water supply and fire sprinkler feed will be tapped off the new loop. In addition, this new water line will feed the fire hydrants in two locations on the southwest and southeast side of the new senior center building. The existing senior living buildings will continue to be fed by the existing services.

It is worth mentioning that the existing water line which crosses the proposed senior center building will be completely removed and the new building will be serviced via the mentioned water line.

Please see Appendix A for Water Calculations and Appendix C for Preliminary Water and Sewer Plan.

3. Sewer Distribution System

The site will be serviced by an existing 8" sewer stub that connects to the existing 24-inch public sewer line along the west boundary of the property. Currently the 8" sewer stub services the existing south building with a 6" sewer service. This sewer service will be removed and rerouted to avoid the new building. It is anticipated that a 6" sewer line will provide enough capacity for the proposed building based on 78 dwelling units. The details of the building service lines will be provided by the plumbing engineer at the time of final design. The new and existing building sewer will combine at the existing 8" sewer stub.

Please see Appendix B for Sewer Calculations and Appendix C for Preliminary Water and Sewer Plan.

APPENDIX A

Water Calculations

Water Demand Calculations

The proposed water system was designed to handle the peak hourly demand of the site. The flow design method and criteria are in accordance with City of Scottsdale design standard. The average daily water demand as well as the peak demand were estimated by using the City of Scottsdale "2018 Design Standards & Policies Manual, Figure 6-1.2 Average Day Water Demands" as follow:

Domestic Water Demand

Number of units for proposed building:
78
Average day demand per room:
0.63 gpm **Average day demand = 78 x 0.63 = 49.14 gpm**

Maximum daily peaking factor:
2.0
Maximum daily demand per dwelling unit:
1.26 gpm
Maximum day demand = 78 x 1.26 = 98.28 gpm

Peak hour demand factor:
3.5
Peak hour demand per dwelling unit:
2.205 gpm
Peak hour demand = 78 x 2.205 = 171.99 gpm

The plumbing engineer will size the domestic water meter at the time of final design.

FIRE FLOW DEMAND

The proposed fire line system was designed to meet 2012 International Fire Code and the City of Scottsdale design criteria. The system was designed based on the area and construction type of the main apartment building as follow:
Area of the New Building: 92,436 sf

Construction Type: II-A, → Fire Flow = 4,500 gpm

Per 2012 International Fire Code, Appendix B, Section B105.2 a 75% reduction in the fire flow can be approved if an approved automatic sprinkler system is installed. The resulting fire flow shall not be less than the required minimum of 1,500 gpm. We are using a fire flow of 1,500 gpm since a 75% reduction would be less than the minimum required fire flow.

Fire Flow: (4,500 gpm) × 0.25 = 1,125 gpm < 1,500 gpm→ Fire Flow = 1,500 gpm

Per the City of Scottsdale, the system is required to provide the fire flow during the peak day demand. Therefore, the design fire flow is:

Design Fire Flow = 1,500 gpm + 171.99 gpm = 1,671.99 gpm

To examine the existing water system, a flow-pressure test was conducted by Arizona Flow Testing LLC along the north property line in Cholla Road. According to the raw flow test results, the static pressures was 76.0 with a residual pressure of 49.0 PSI flowing 1,504 GPM. The results from the fire flow test were put into the Anvil Fire – Flow Test Graph to determine the residual pressure at the fire flow demand as well as peak hour demand. The Anvil Fire - Flow Test Graph provides a N1.85 Logarithmic Graph based on NFPA 291 recommendations. Based on the Anvil Fire - Flow Test Graph a peak hour demand and fire flow demand of 1,671.99 gpm results in a residual pressure of 43 psi. Please see attached fire flow test result and Anvil Fire – Flow Test Graph included in this report.

The resulting 43 psi was then converted to head (ft) as shown in pressure conversion equation attached to the end of this appendix. The conversion of 43 psi equated to a pressure heads of 99 ft. To model the system, Bentley WaterCAD V8 XM Edition was used. The proposed domestic and fire systems were modeled using a reservoir with the head elevation applied at the connections to the existing public water main. All minor friction losses due to fittings were included in the analysis.

Per modelling results for the proposed water line, the peak hour demand and fire demand of 1,671.99 gpm resulted in a pressure of 33 psi at the most remote fire hydrant H-1 and 42 psi at fire hydrant H-2. Therefore, the proposed public water main has the required capacity to service the proposed development. Please see the following documents for the detailed test results and model.

Arizona Flow Testing LLC

HYDRANT FLOW TEST REPORT

Project Name:	Megerdichian Senior Center
Project Address:	8849 East Cholla Street, Scottsdale, Arizona 85260
Client Project No.:	K15153
Arizona Flow Testing Project No.:	20292
Flow Test Permit No.:	C62860
Date and time flow test conducted:	August 6, 2020 at 7:00 AM
Data is current and reliable until:	February 6, 2021
Conducted by:	Floyd Vaughan – Arizona Flow Testing, LLC (480-250-8154)
Witnessed by:	Jared Berry – City of Scottsdale-Inspector (602-541-4942)

Raw Test Data

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

Residual Pressure: **49.0 PSI**
(Measured in pounds per square inch)

Pitot Pressure: **16.0 PSI**
(Measured in pounds per square inch)

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

Coefficient of Diffuser: .7875

Flowing GPM: **1,504 GPM**
(Measured in gallons per minute)

GPM @ 20 PSI: **2,230 GPM**

Data with 10% Safety Factor

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

Residual Pressure: **41.4 PSI**
(Measured in pounds per square inch)

Distance between hydrants: Approx. 190 Feet

Main size: Not Provided

Flowing GPM: **1,504 GPM**

GPM @ 20 PSI**:** **2,061 GPM**

Flow Test Location **North**

Logarithmic Graph of Water Supply

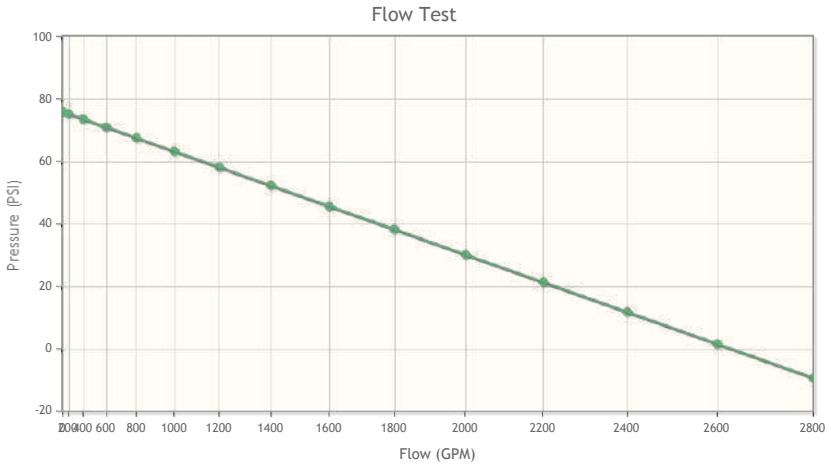
Summary: This app provides a N^1.85 logarithmic graph based on NFPA 291 recommendations. We also offer a blank PDF logarithmic flow test sheet.

Graph Points

76	Static Pressure
49	Residual Pressure
1504	Residual Flow

Data Points

Flow	Pressure
1671.99	43.157



Reservoir - Pressure Conversion

8-in Water Line in Cholla Road

Residual Pressure = * 43 psi

$$H = \frac{P_d}{\gamma}$$

P_d= Static Pressure (psi)

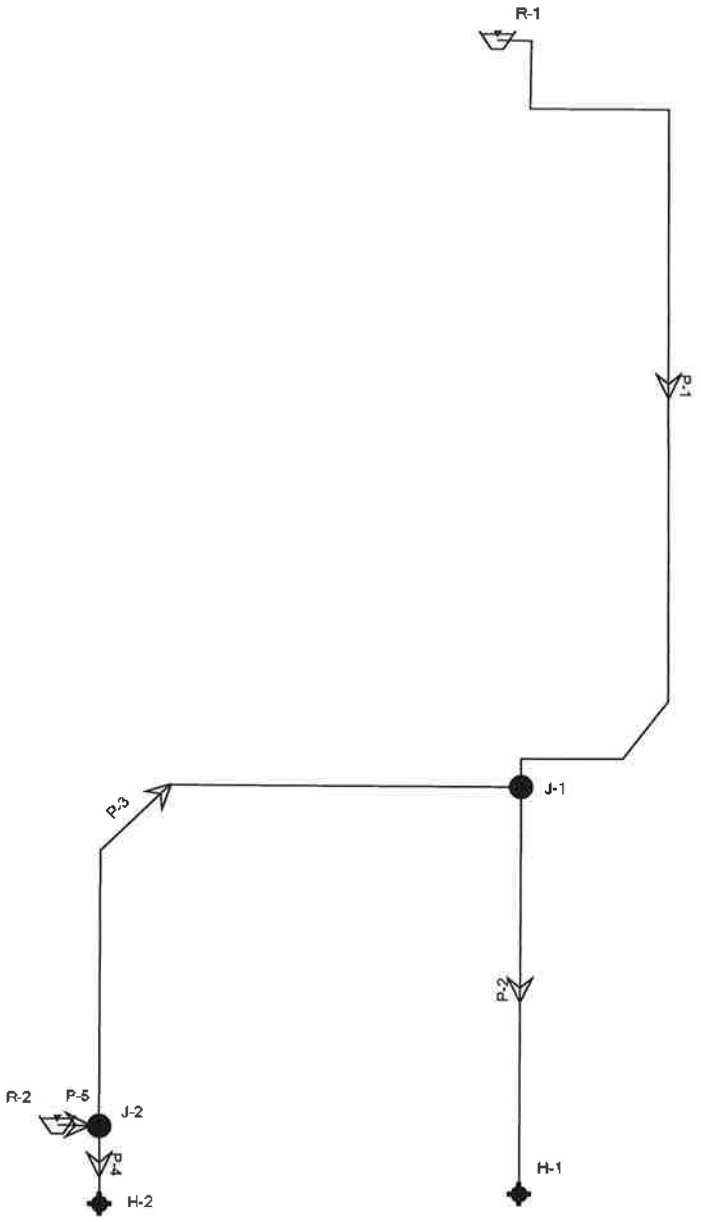
γ= Specific Weight lb/ft^3

$$H = \frac{(43)(144\ in^2/ft^2)}{62.4\ lb/ft^3}$$

H= 99 ft

* Residual pressure is based on flow test for a demand of 1,671.99 gpm.

Scenario: Base



FlexTable: Reservoir Table

Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
R-1	183.80	483	183.80
R-2	183.80	1,189	183.80

FlexTable: Junction Table

Label	Elevation (ft)	Hydraulic Grade (ft)	Pressure (psi)
J-1	82.40	173.85	40
J-2	81.60	181.70	43

FlexTable: Pipe Table

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Pressure (Start) (psi)	Pressure (Stop) (psi)	Headloss (ft)
P-1	517	R-1	J-1	6.0	DIP	130.0	483	5.48	0	40	9.95
P-2	203	J-1	H-1	6.0	DIP	130.0	1,000	11.35	40	33	15.03
P-3	359	J-1	J-2	6.0	DIP	130.0	-517	5.87	40	43	7.85
P-4	39	J-2	H-2	6.0	DIP	130.0	672	7.63	43	42	1.38
P-5	21	J-2	R-2	6.0	DIP	130.0	-1,189	13.49	43	0	2.10

FlexTable: Hydrant Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
H-1	83.30	1,000	158.81	33
H-2	83.80	672	180.33	42

APPENDIX B

Sanitary Sewer Calculations

Sewer Demand Calculations

The sewer system was designed to handle the peak discharge from the site. The flow design method and criteria are in accordance with City of Scottsdale design standard. The average daily discharge as well as the peak demand were estimated by using the City of Scottsdale "2018 Design Standards & Policies Manual, Figure 7-1.2 Average Day Sewer Demand in Gallons Per Day & Peaking Factors by Land Use" as follow:

Average daily flow

Number of Room:
88 (10 exiting and 78 new building)
Average day demand per dwelling unit:
380 gpd
Peak factor:
4.5

Average day demand = 88 x 380 = 33,440 gpd (23.22 gpm)

Peak day Demand = 23.22 cfs x 4.5 = 104.50 gpm

The existing and new building will be service with a 6" sewer service. The sewer services will combine and discharge to the existing 8" sewer stub along the west property line. This sewer stub currently accepts the exiting flows from the existing south building. The sewer service design will be finalized by the plumbing engineer based on the 2012 I.P.C.

Sewer Service Capacity

The capacities of the proposed 6-in services were estimated using Manning's Equation assuming n=0.013 as follow:

$V = 1.49/n \times R^{2/3} \times S^{1/2}$ $R = A/P$; $Q = V \times A$

A: Flow area of the pipe (sf)
P: Wetted perimeter (ft)
S: Downward (longitudinal) slope (ft/ft)
V: Average velocity in the pipe (ft/s)

n: Manning's Roughness Coefficient (0.013)

Q = Flow Rate, (cfs)

R = Hydraulic Radius, (ft)

According to the results of sewer model attached to the end of this appendix:

- The capacity of the proposed 6-in sewer service with slope of 1.0% = 0.56 cfs or 251.83 gpm > 104.50 gpm
- The capacity of the existing 8-in sewer service with slope of 6.96% = 3.19 cfs or 1,430.80 gpm > 104.50 gpm

Therefore, the proposed sewer services have enough capacity to service the hotel for the design peak flow.

6" Sewer
Worksheet for Circular Channel

Project Description	
Worksheet	6" Sewer
Flow Element	Circular Channe
Method	Manning's Form
Solve For	Full Flow Capac

Input Data		
Mannings Coeffic	0.013	
Channel Slope	1.00	%
Diameter	6.0	in

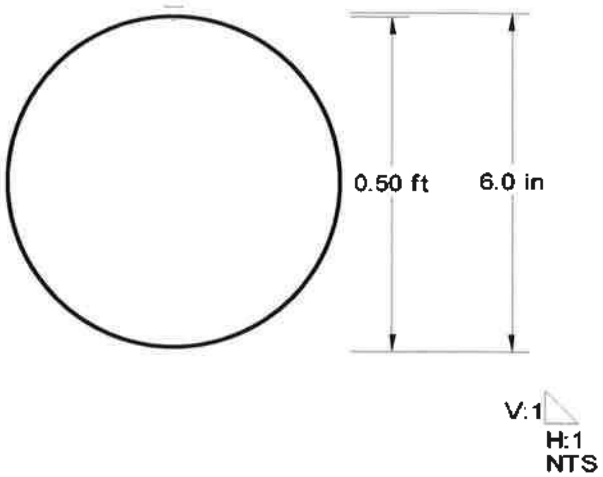
Results		
Depth	0.50	ft
Discharge	51.83	gpm
Flow Area	0.2	ft²
Wetted Perime	1.57	ft
Top Width	0.00	ft
Critical Depth	0.38	ft
Percent Full	100.0	%
Critical Slope	1.16	%
Velocity	2.86	ft/s
Velocity Head	0.13	ft
Specific Energy	0.63	ft
Froude Numbe	0.00	
Maximum Disc	70.89	gpm
Discharge Full	51.83	gpm
Slope Full	1.00	%
Flow Type	N/A	

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

6" Sewer
Cross Section for Circular Channel

Project Description	
Worksheet	6" Sewer
Flow Element	Circular Channe
Method	Manning's Form
Solve For	Full Flow Capac

Section Data		
Mannings Coeffic	0.013	
Channel Slope	1.00	%
Depth	0.50	ft
Diameter	6.0	in
Discharge	51.83	gpn



8" Sewer
Worksheet for Circular Channel

Project Description	
Worksheet	8" Sewer
Flow Element	Circular Channe
Method	Manning's Forn
Solve For	Full Flow Capac

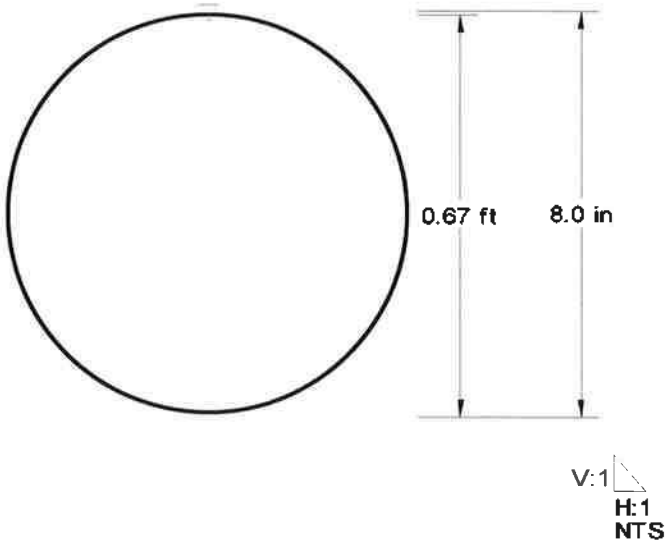
Input Data		
Mannings Coeffic	0.013	
Channel Slope	6.96	%
Diameter	8.0	in

Results		
Depth	0.67	ft
Discharge	,430.80	gpm
Flow Area	0.3	ft²
Wetted Perime	2.09	ft
Top Width	0.00	ft
Critical Depth	0.66	ft
Percent Full	100.0	%
Critical Slope	6.41	%
Velocity	9.13	ft/s
Velocity Head	1.30	ft
Specific Energ	1.96	ft
Froude Numbe	0.00	
Maximum Disc	,539.12	gpm
Discharge Full	,430.80	gpm
Slope Full	6.96	%
Flow Type	N/A	

8" Sewer
Cross Section for Circular Channel

Project Description	
Worksheet	8" Sewer
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Capac

Section Data		
Mannings Coeffic	0.013	
Channel Slope	6.96	%
Depth	0.67	ft
Diameter	8.0	in
Discharge	,430.80	gpn



APPENDIX C

Water and Sewer Quarter Section Map

30-49

29-48

29-50

28-49

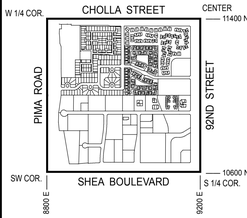
GENERAL NOTES:

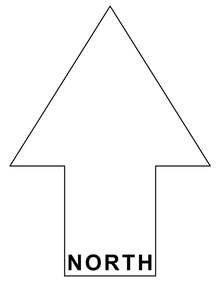
- THIS IS A COMPUTER GENERATED DRAWING. FOR ANY REVISIONS PLEASE CONTACT THE CITY OF SCOTTSDALE GIS DEPARTMENT AT (480) 312-7792.
- THE SECTION LINE BEARING AND DISTANCES ARE BASED ON THE CITY OF SCOTTSDALE GPS SURVEY OF SEPTEMBER, 1991. BEARINGS ARE NAD 83 GRID AND DISTANCES ARE FLATTENED TO GROUND. WHERE NO CORNER WAS FOUND THE DIMENSIONS ARE GIVEN TO CALCULATED SECTION CORNERS AND ARE NOTED AS 'CALCULATED' ON THE MAP.

LEGEND:

- Water Valve
- Non-potable Water Valve
- Fire Hydrant
- Water Blowoff
- Water Main Reducer
- Water Sample Station
- Water Air Release Valve
- Non-potable Water Air Release Valve
- Water Pressure Reducing Valve
- Water Vault
- Water Manhole
- Non-Potable Water Manhole
- Water Pump
- Water Main
- Non-Potable Water Main
- Fire Line
- Water Service
- Non-Scottsdale Water Main
- Sewer Manhole
- Sewer Cleanout
- Sewer Lift Station
- Sewer Treatment Plant
- Sewer Main - Gravity
- Sewer Main - Force
- Non-Scottsdale Sewer Main
- Sewer Service

VICINITY MAP





SCALE: 1" = 100'

0 50 100 200

The map scale of 1" = 100' is based on a full size print of 30" x 36"

WATER & SEWER

QUARTER SECTION MAP

29-49

SW 1/4 SEC. 19 T3N R5E

CITY OF SCOTTSDALE

SCOTTSDALE GEOGRAPHIC INFORMATION SYSTEMS

3629 North Drinkwater Boulevard
Scottsdale, Arizona 85251

06-AUG-17

APPENDIX D

Water and Sewer Master Plan

BENCHMARK

FOUND BRASS CAP IN HANDHOLE AT THE INTERSECTION OF 92ND STREET AND CHOLLA STREET. CITY OF SCOTTSDALE GPS POINT 8194.
ELEV = 1388.480 (NAVD '88, CITY OF SCOTTSDALE DATUM)

FOUND BRASS CAP IN HANDHOLE AT THE INTERSECTION OF 92ND STREET AND SHEA BOULEVARD. CITY OF SCOTTSDALE GPS POINT 8301.
ELEV = 1372.195 (NAVD '88, CITY OF SCOTTSDALE DATUM)

FOUND BRASS CAP IN HANDHOLE AT THE INTERSECTION OF 84TH STREET AND SHEA BOULEVARD. CITY OF SCOTTSDALE GPS POINT 3251.
ELEV = 1364.811 (NAVD '88, CITY OF SCOTTSDALE DATUM)

LEGAL DESCRIPTION

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE COUNTY OF MARICOPA, STATE OF ARIZONA AND IS DESCRIBED AS FOLLOWS:
LOT 1, A PROPERTY ASSEMBLAGE IN THE CITY OF SCOTTSDALE, ARIZONA ARMENIAN APOSTOLIC CHURCH OF ARIZONA, ACCORDING TO BOOK 971 OF MAPS, PAGE 46, AND THEREAFTER AFFIDAVIT OF CORRECTION IN RECORDING NO. 2008-028799, RECORDS OF MARICOPA COUNTY, ARIZONA.

BASIS OF BEARING

THE MONUMENT LINE OF 92ND STREET. SAID LINE BEARS SOUTH 00 DEGREES 01 MINUTES 20 SECONDS EAST.

FLOOD ZONE

ACCORDING TO THE FLOOD INSURANCE RATE MAP #04013C1760L, DATED OCTOBER 16, 2013, THIS PROPERTY IS LOCATED IN FLOOD ZONE "X".

ARCHITECT

AAKAII ARCHITECTURE AND INTERIORS
7585 E. REDFIELD RD., STE 106
SCOTTSDALE, AZ 85260
PH: (480) 588-5852
CONTACT:

ENGINEER

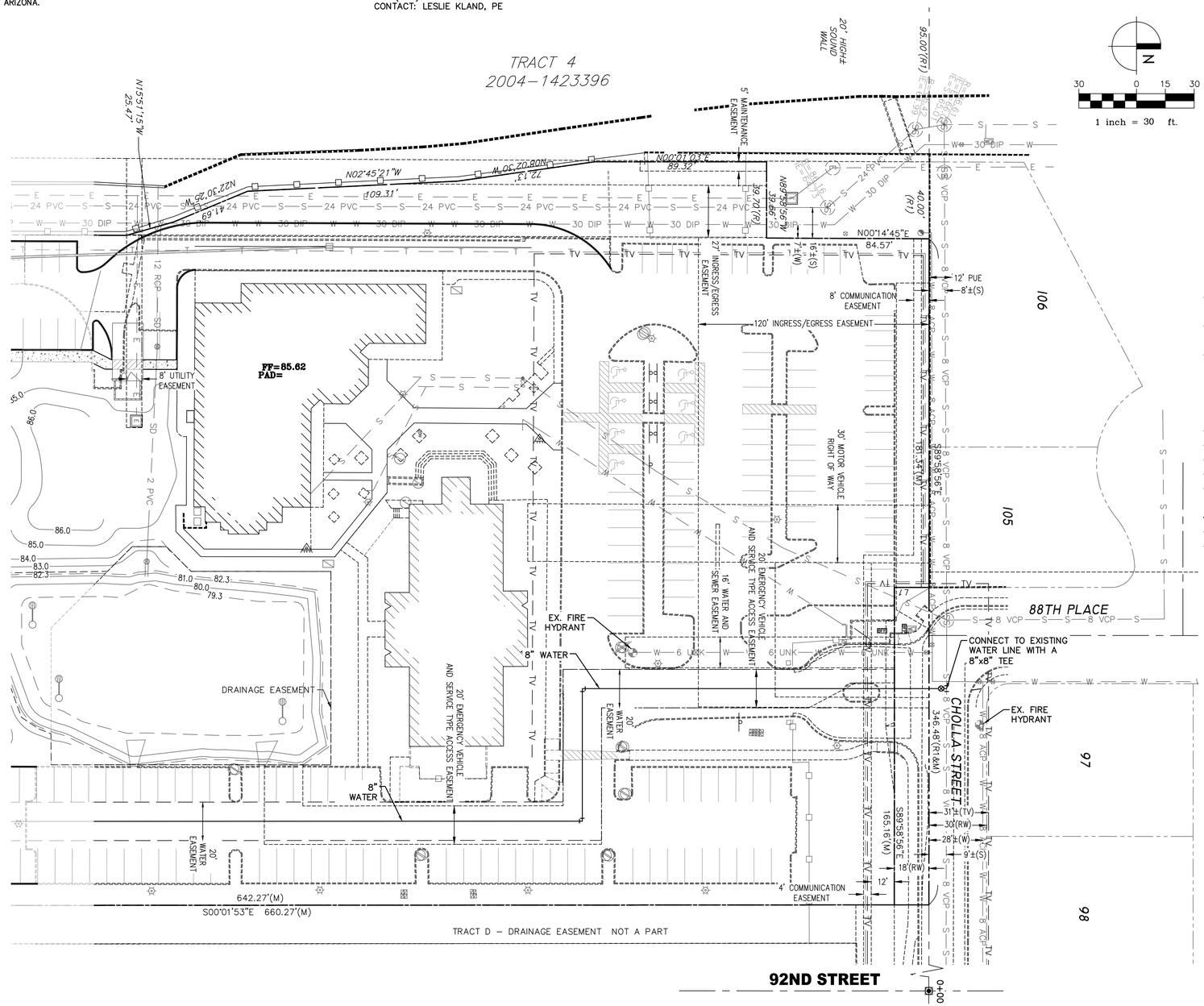
KLAND CIVIL ENGINEERS
7227 N. 16TH ST., STE 217
PHOENIX, AZ 85020
PH: (480) 344-0480
CONTACT: LESLIE KLAND, PE

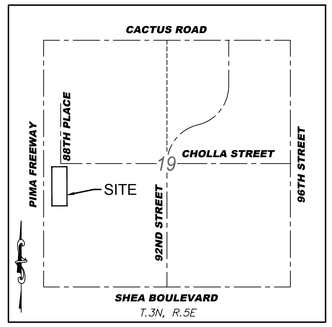
MASTER WATER AND SEWER PLAN

MEGERDICHIAN SENIOR CENTER

8849 EAST CHOLLA STREET, SCOTTSDALE, ARIZONA 85260

A PORTION OF LOT 3 IN THE SOUTHWEST QUARTER OF SECTION 19, TOWNSHIP 3 NORTH, RANGE 5 EAST, OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA.





VICINITY MAP
N.T.S.

LEGEND

EXISTING	DESCRIPTION	PROPOSED
	SURVEY MARKER	
	CURB AND GUTTER	
	SIDEWALK	
	SINGLE CURB	
	WATER FITTINGS	
	WATER METER	
W	WATER LINE	
	FIRE HYDRANT	
S	SEWER LINE	
	SEWER MANHOLE/CLEANOUT	
SD	STORM DRAIN	
	CATCH BASIN	
	UNDERGROUND STORAGE TANK	
	DRY WELL	
	FINISHED FLOOR	FF=43.81 PAD=
G	GAS LINE/METER/VALVE	
E	ELECTRIC LINE/METER	
TV	CABLE/JUNCTION BOX	
T	COMMUNICATION LINE	
OHE	OVERHEAD ELECTRIC/POLE	
	VEGETATION	
	BOUNDARY LINE	
	CENTER LINE	
	EASEMENT	

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7585 e redfield rd #106 scottsdale arizona 85260
480.588.5852
aakaii.com

MEGERDICHIAN SENIOR CENTER
8849 E. CHOLLA ST. SCOTTSDALE, AZ 85260

PRE-CONSTRUCTION PHASE

NO.	ISSUED FOR:	DATE
	REZONING & C.U.P.	12-13-2018
	REZONING & C.U.P. 2nd Review	08-03-2020
	REZONING & C.U.P. 3rd Review	12-08-2020

CONSTRUCTION PHASE

REV.	BULLETIN #	DATE

Registered Professional Engineer (Civil) CERTIFICATE NO. 31695 LESLIE J. KLAND Date Signed 12-8-20 ARIZONA
Expires 09/30/21

KLAND CIVIL ENGINEERS
CIVIL ENGINEERING
LAND DEVELOPMENT SERVICES
LAND SURVEYING
7227 N. 16th St., Suite 217
Phoenix, Arizona 85020
PHONE: (480) 344-0480
www.klandeng.com

SHEET TITLE

MASTER WATER AND SEWER PLAN

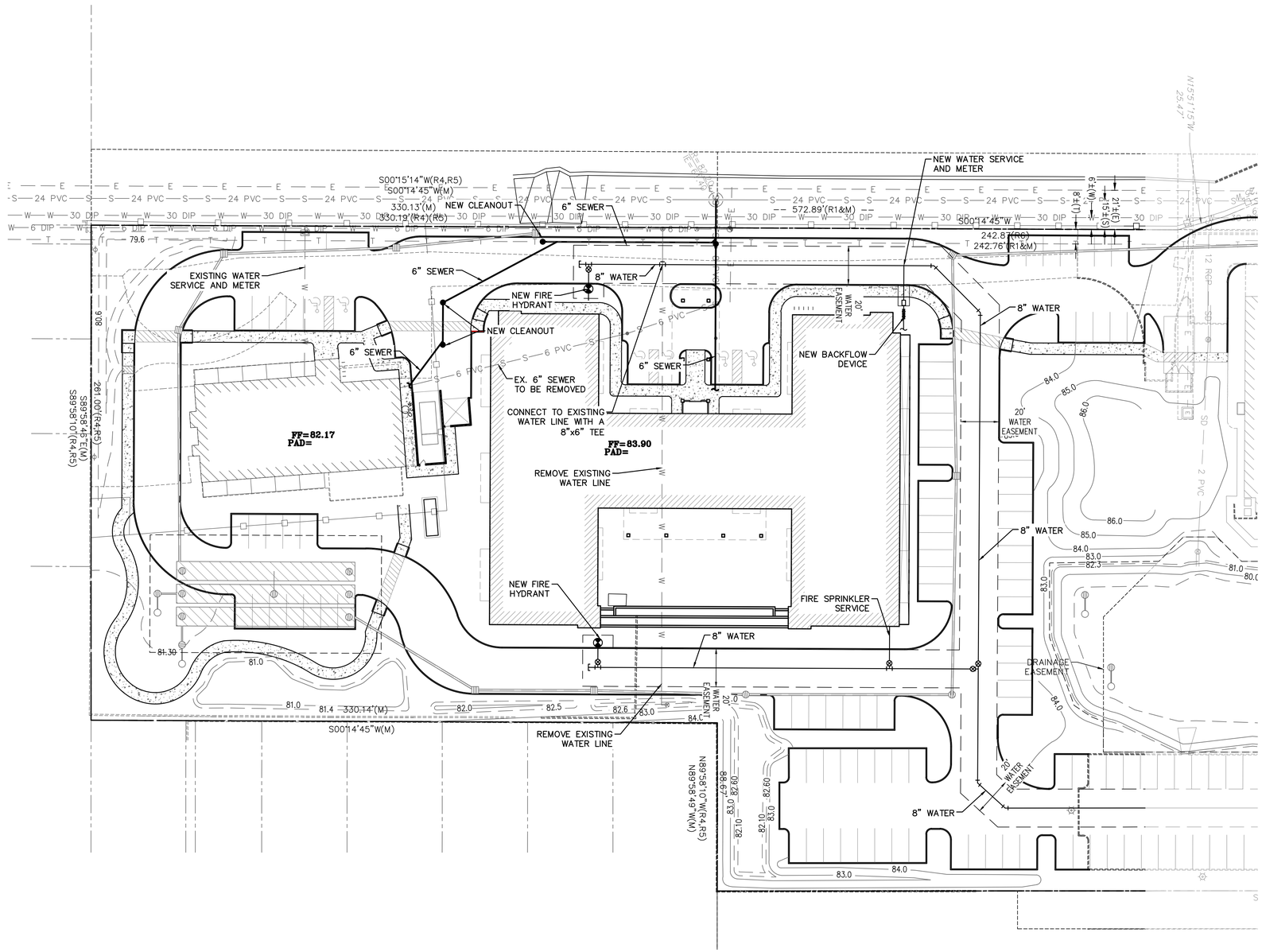
DATE: 12/08/2020
JOB NUMBER 1727-00
KLAND PROJECT NUMBER: K1515S

MWS1
OF 2

25-ZN-2018

Call at least two full working days before you begin excavation. ARIZONA 811 Arizona Blue Stake, Inc. Dial 8-1-1 or 1-800-STAKE-IT (782-5348) In Maricopa County: (602) 263-1100

K:\2016\K-15\53 Megerdichian Senior Center\Dwg\CONCEPT\Concept1\153-HS.dwg



N

30 0 15 30

1 inch = 30 ft.

aakaii architecture + interiors

7505 e mcdowell rd #106 scottsdale arizona 85260 480.588.8852 aakaii.com © 2018

MEGERDICHIAN SENIOR CENTER

8849 E. CHOLLA ST.
SCOTTSDALE, AZ 85260

PRE-CONSTRUCTION PHASE

NO.	ISSUED FOR:	DATE
	REZONING & C.U.P.	12-13-2018
	REZONING & C.U.P. 2nd Review	08-03-2020
	REZONING & C.U.P. 3rd Review	12-08-2020

CONSTRUCTION PHASE

REV.	BULLETIN #	DATE

Registered Professional Engineer (Civil) CERTIFICATE NO. 31695 LESLIE J. KLAND Date Signed June 1, 20 ARIZONA

Expires 09/30/21

KLAND
CIVIL ENGINEERS

CIVIL ENGINEERING
LAND DEVELOPMENT SERVICES
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7227 N. 16th St., Suite 217
Phoenix, Arizona 85020
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www.klandeng.com

SHEET TITLE

MASTER WATER AND SEWER PLAN

DATE: 12/08/2020
JOB NUMBER 1727-00
KLAND PROJECT NUMBER: K15153

MWS2
OF 2

Call at least two full working days before you begin excavation.
ARIZONA 811 Arizona Blue Stake, Inc.
Dial 8-1-1 or 1-800-STAKE-IT (782-5348)
In Maricopa County: (602) 263-1100

25-ZN-2018

K:\2018\K1853 Megerdichian Senior Center\Dwg\CONCEPT\Concept\1053-HS.dwg