

**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:

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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

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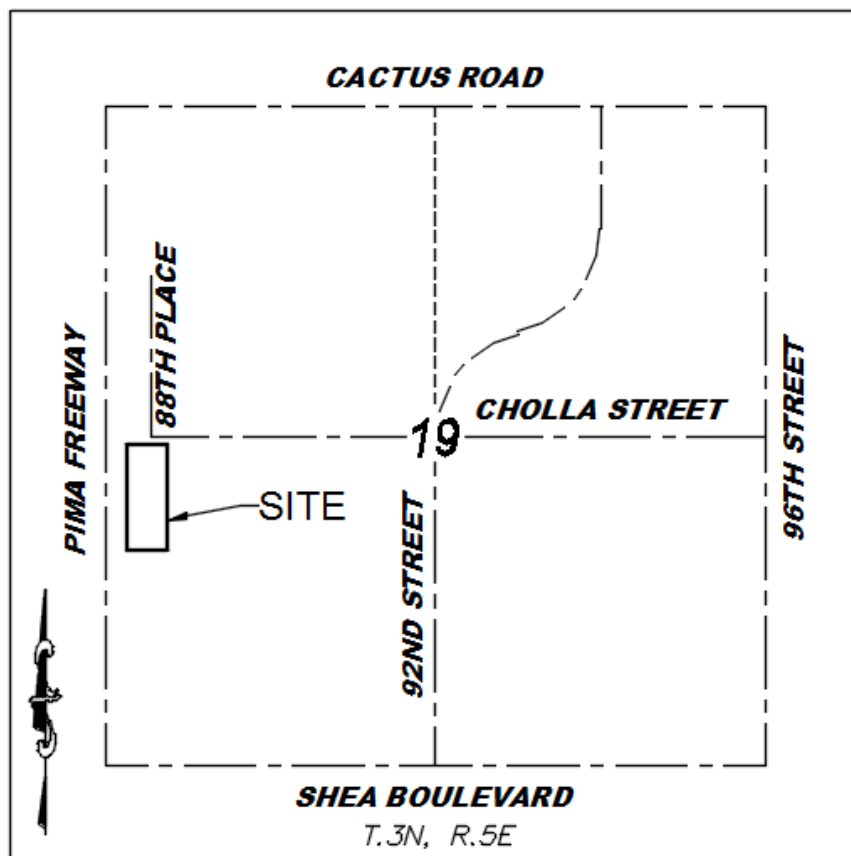


Revised December 8, 2020  
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## 1. Introduction

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:

$$0.63 \text{ gpm Average day demand} = 78 \times 0.63 = 49.14 \text{ gpm}$$

Maximum daily peaking factor:

2.0

Maximum daily demand per dwelling unit:

1.26 gpm

$$\text{Maximum day demand} = 78 \times 1.26 = 98.28 \text{ gpm}$$

Peak hour demand factor:

3.5

Peak hour demand per dwelling unit:

2.205 gpm

$$\text{Peak hour demand} = 78 \times 2.205 = 171.99 \text{ gpm}$$

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:  $(4,500 \text{ gpm}) \times 0.25 = 1,125 \text{ gpm} < 1,500 \text{ gpm} \rightarrow \text{Fire Flow} = 1,500 \text{ gpm}$

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.





- [PACKAGED ENCLOSURES](#)
- [PUMPS](#)
- [APPS](#)
- [BLOG](#)
- [CONTACT](#)



### Logarithmic Graph of Water Supply

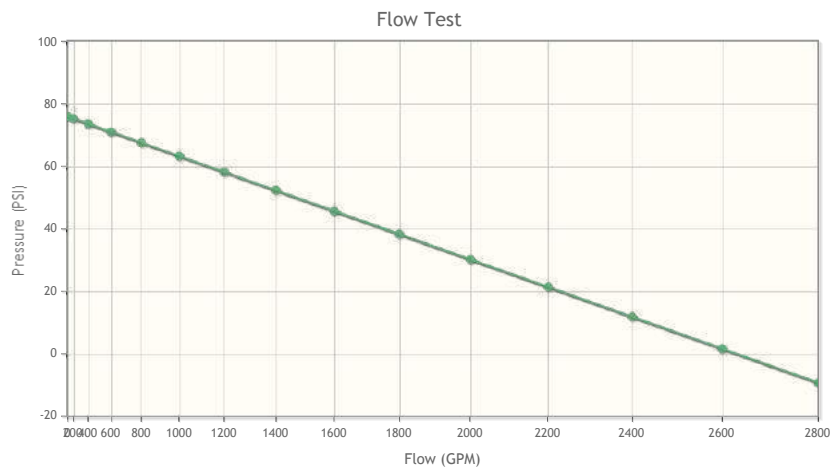
Summary: This app provides a  $N^{1.85}$  logarithmic graph based on NFPA 291 recommendations. We also offer a blank PDF logarithmic flow test sheet.

### Graph Points

- 76 Static Pressure
- 49 Residual Pressure
- 1504 Residual Flow

### Data Points

Flow  Pressure



## Reservoir - Pressure Conversion

8-in Water Line in Cholla Road

Residual Pressure = \* 43 psi

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

$P_d$  = Static Pressure (psi)

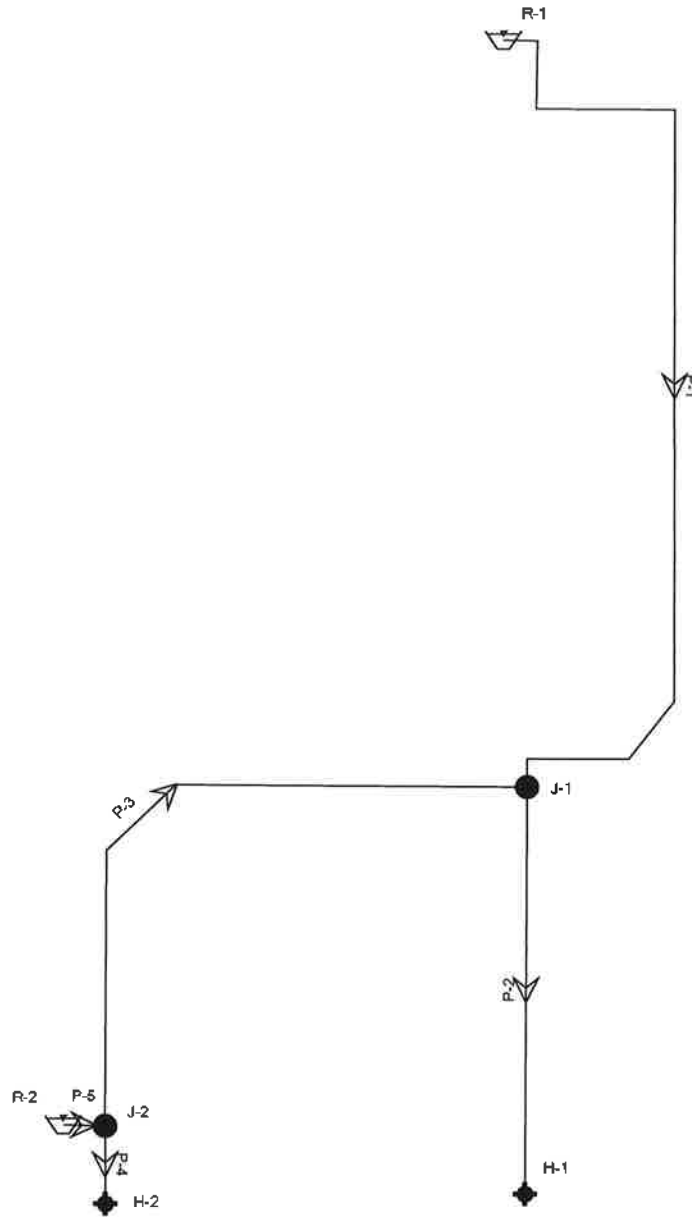
$\gamma$  = Specific Weight lb/ft<sup>3</sup>

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

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 =  $88 \times 380 = 33,440$  gpd (23.22 gpm)

Peak day Demand =  $23.22 \text{ cfs} \times 4.5 = 104.50$  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:

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

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

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

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Input Data	
Mannings Coeffic	1.013
Channel Slope	1.00 %
Diameter	6.0 in

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Results	
Depth	0.50 ft
Discharge	:51.83 gpm
Flow Area	0.2 ft <sup>2</sup>
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 Energ	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

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# 6" Sewer Cross Section for Circular Channel

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## Project Description

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

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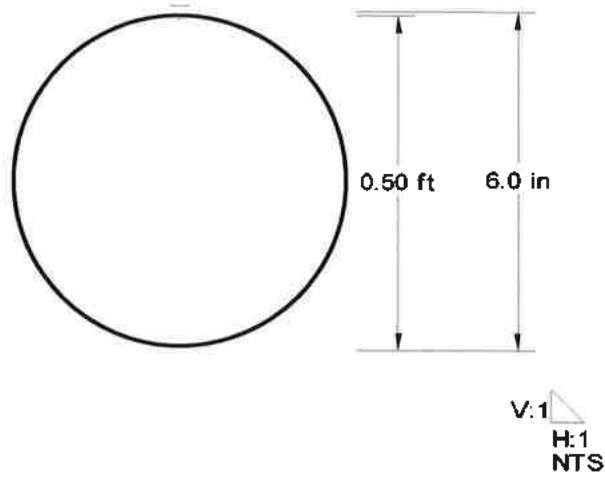
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## Section Data

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Mannings Coeff	0.013
Channel Slope	1.00 %
Depth	0.50 ft
Diameter	6.0 in
Discharge	51.83 gpm

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## 8" Sewer Worksheet for Circular Channel

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

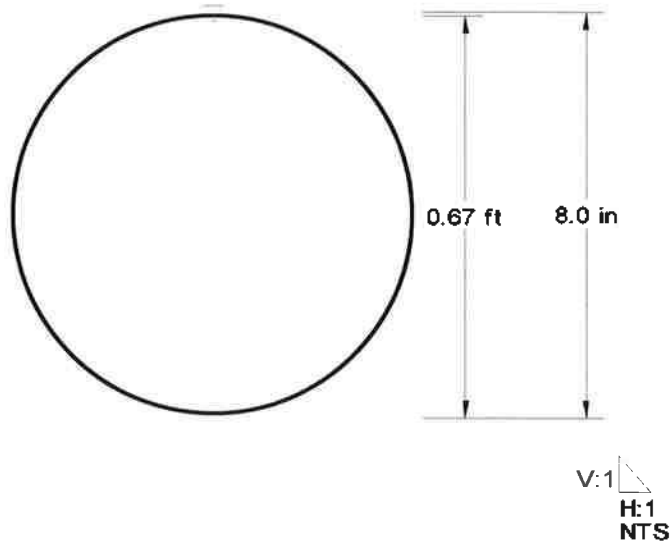
Input Data	
Mannings Coefficient	0.013
Channel Slope	6.96 %
Diameter	8.0 in

Results	
Depth	0.67 ft
Discharge	,430.80 gpm
Flow Area	0.3 ft <sup>2</sup>
Wetted Perimeter	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 Energy	1.96 ft
Froude Number	0.00
Maximum Discharge	,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 Channel
Method	Manning's Form
Solve For	Full Flow Capac

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



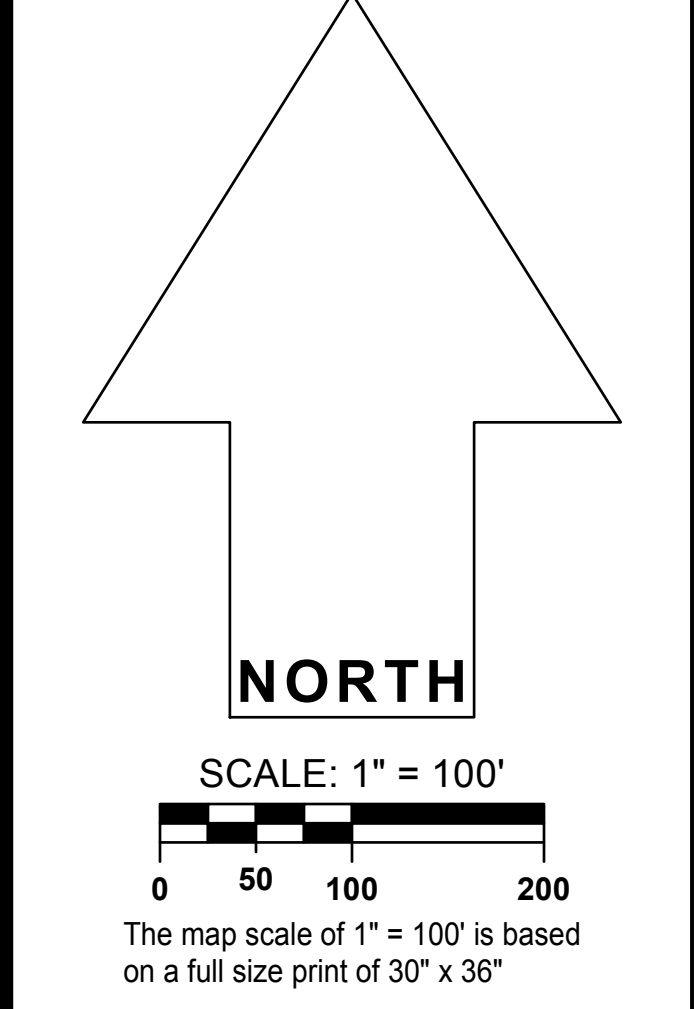
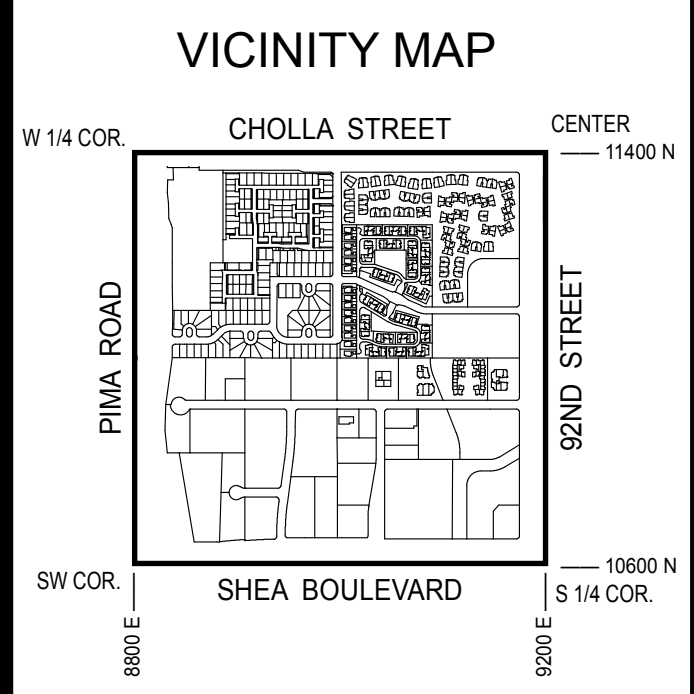
# APPENDIX C

## Water and Sewer Quarter Section Map

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:

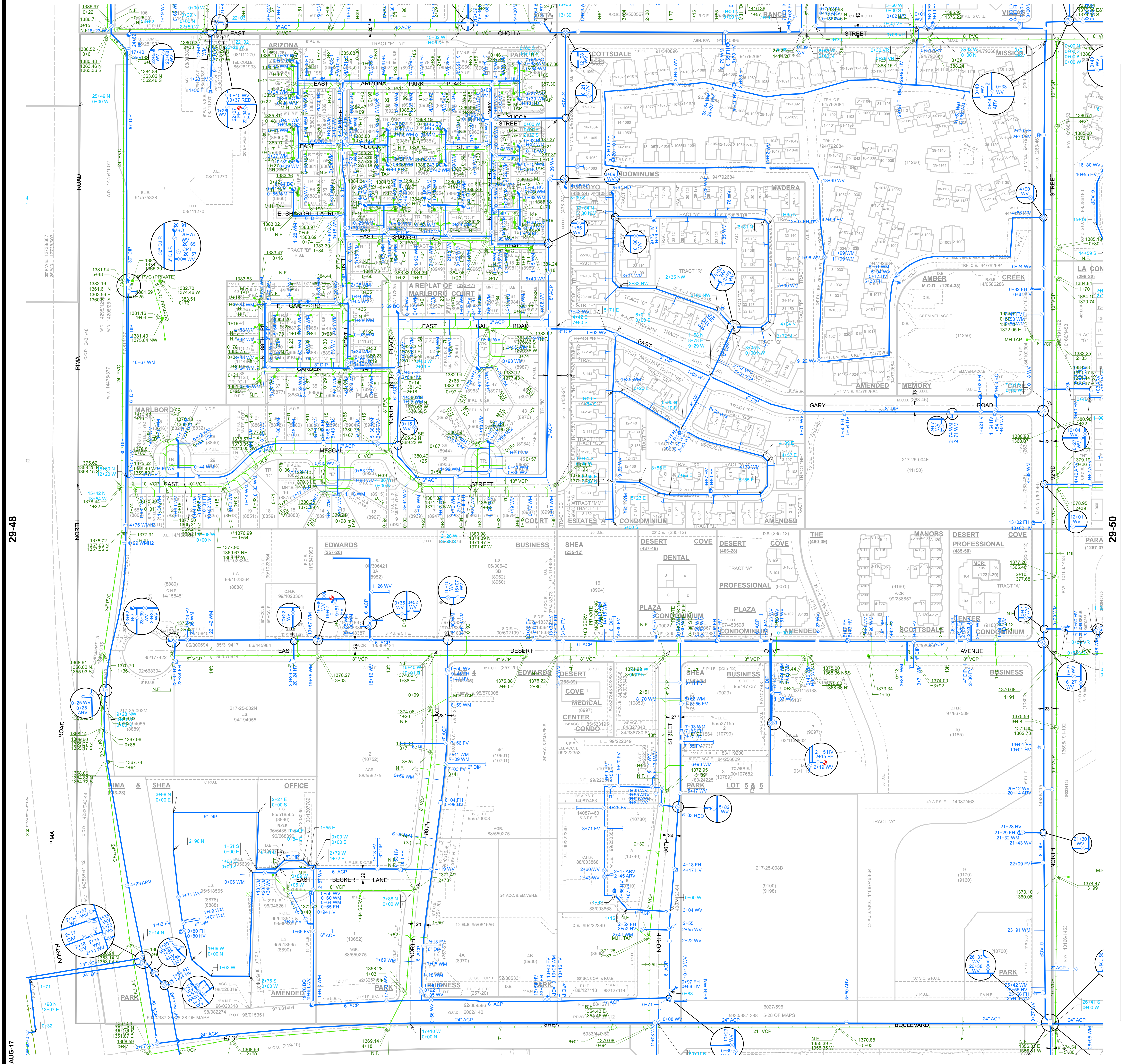
- Water Valve
- Non-potable Water Valve
- Fire Hydrant
- Water Blowoff
- Water Main Reducer
- Water Sample Station
- Water Air Release Valve
- Non-potable Water Air Release Valve
- Water Pressure Reducing Valve
- Water Vault
- Water Manhole
- Non-Potable Water Manhole
- Water Pump
- Water Main
- Non-Potable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



**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

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THE CITY OF SCOTTSDALE



# 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. 2008-0228799, 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 18, 2013, THIS PROPERTY IS LOCATED IN FLOOD ZONE "X".

**ARCHITECT**

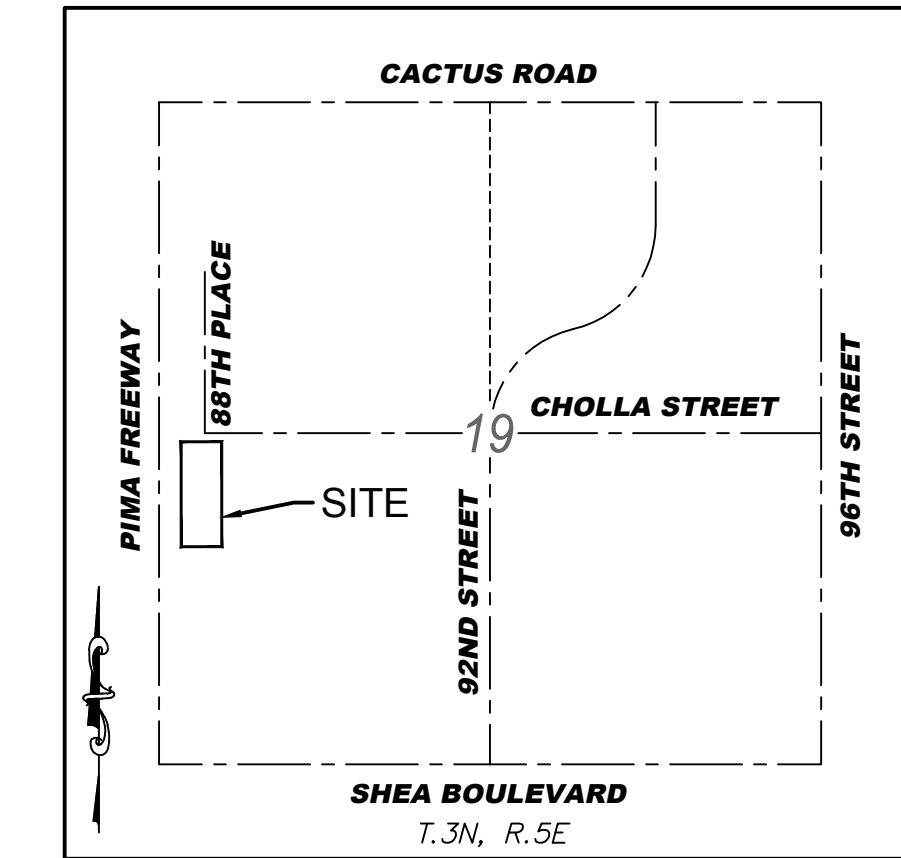
AAKAI ARCHITECTURE AND INTERIORS  
7585 E. REDFIELD RD., STE 106  
SCOTTSDALE, AZ 85260  
PH: (480) 588-5852  
CONTACT:

**ENGINEER**

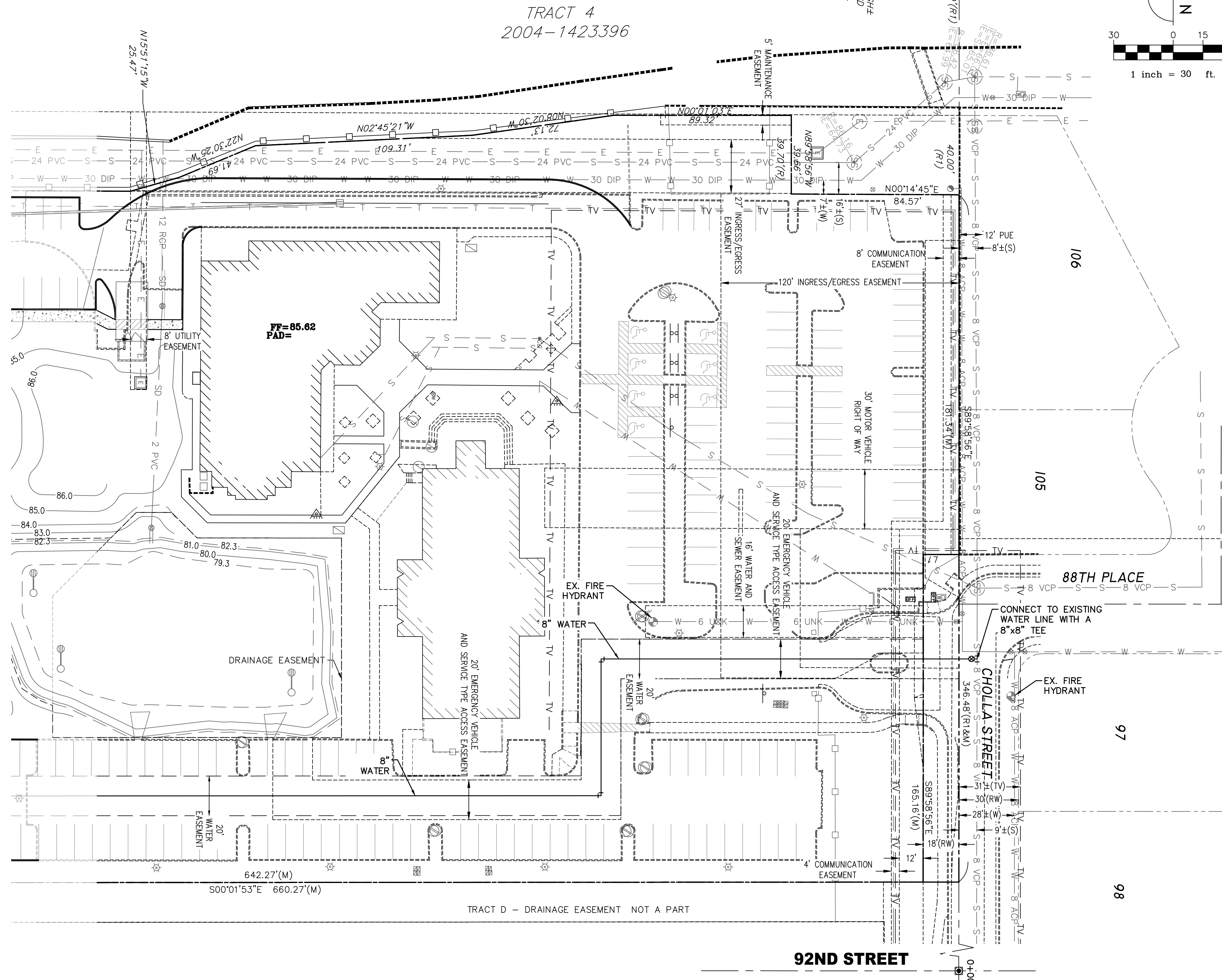
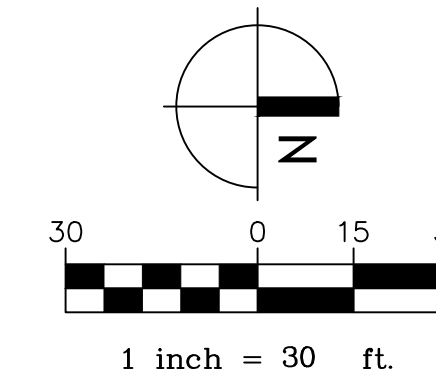
KLAND CIVIL ENGINEERS  
7227 N. 16TH ST., STE 217  
PHOENIX, AZ 85020  
PH: (480) 344-0480  
CONTACT: LESLIE KLAND, PE

**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	—
—	WATER LINE	—
—	FIRE HYDRANT	—
—	SEWER LINE	—
—	SEWER MANHOLE/CLEANOUT	—
—	STORM DRAIN	—
—	CATCH BASIN	—
—	UNDERGROUND STORAGE TANK	—
—	DRY WELL	—
—	FINISHED FLOOR	—
—	GAS LINE/METER/VALVE	—
—	ELECTRIC LINE/METER	—
—	CABLE/JUNCTION BOX	—
—	COMMUNICATION LINE	—
—	OVERHEAD ELECTRIC/POLE	—
—	VEGETATION	—
—	BOUNDARY LINE	—
—	CENTER LINE	—
—	EASEMENT	—

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

PRE-CONSTRUCTION PHASE

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

CONSTRUCTION PHASE

REV.	BULLETIN #	DATE



**KLAND CIVIL ENGINEERS**  
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SERVICES  
LAND SURVEYING  
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Phoenix, Arizona 85020  
PHONE: (480) 344-0480  
www.klandeng.com

SHEET TITLE  
**MASTER WATER AND SEWER PLAN**

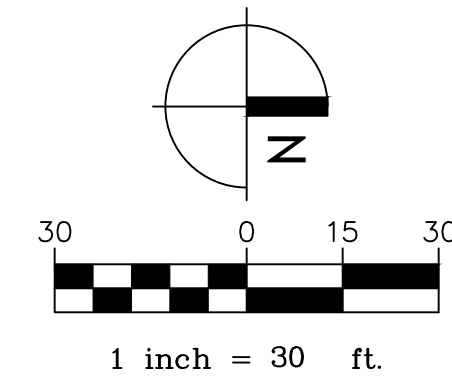
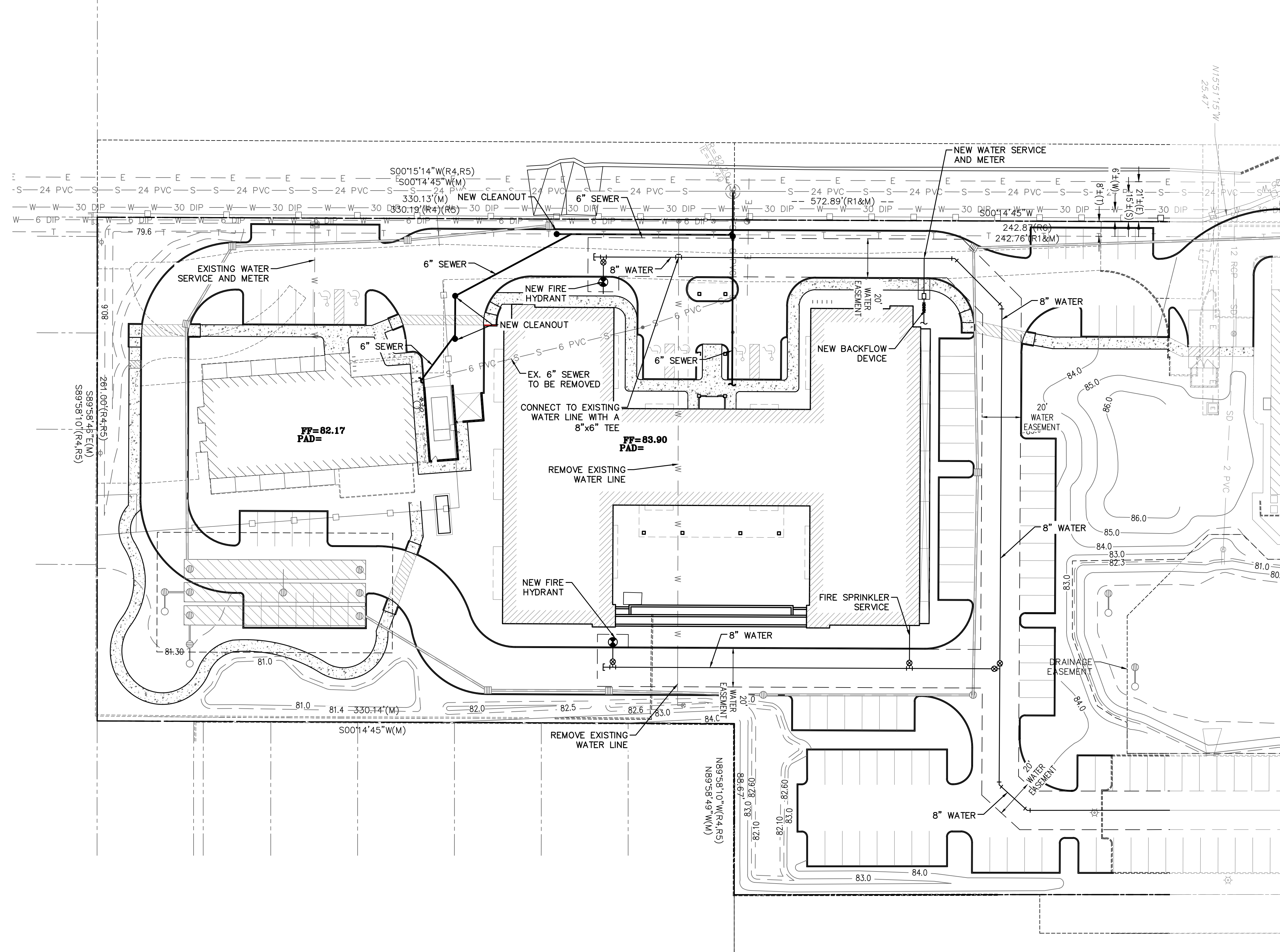
DATE: 12/08/2020  
JOB NUMBER: 1727-00  
KLAND PROJECT NUMBER: K15153



**MWS1 OF 2**

25-ZN-2018

K:\CD\151583 Megerdichian Senior Center\DWG\CONCEPT\CONCEPT151583-H2.dwg



**akai** architecture + interiors  
7965 a road of #106 scottsdale arizona 85260  
480.588.5832  
akai.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. 08-03-2020
	2nd Review
	REZONING & C.U.P. 12-08-2020
	3rd Review
CONSTRUCTION PHASE	
REV.	BULLETIN # DATE



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PHONE: (480) 344-0480  
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**MASTER WATER AND  
SEWER PLAN**

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



**MWS2  
OF 2**

**25-ZN-2018**