

# PRELIMINARY SEWER REPORT

## PRELIMINARY Basis of Design Report

- ACCEPTED  
 ACCEPTED AS NOTED  
 REVISE AND RESUBMIT



Disclaimer: If accepted; the preliminary approval is granted under the condition that a final basis of design report will also be submitted for city review and approval (typically during the DR or PP case). The final report shall incorporate further water or sewer design and analysis requirements as defined in the city design standards and policy manual and address those items noted in the preliminary review comments (both separate and included herein). The final report shall be submitted and approved prior to the plan review submission.

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

BY Idillon DATE 11/9/2020

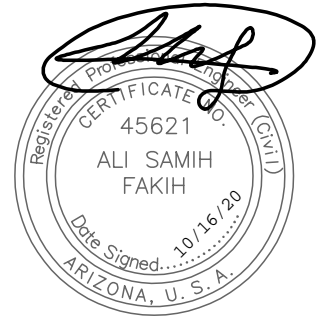
## The Triangle

7120 E. Indian School Road  
Scottsdale, AZ 85251

Prepared For:

# Gensler

2575 E. Camelback Rd Suite 175  
Phoenix, AZ 85016  
Phone: 602-523-4900



Accepted as noted, comments below to be stipulated if noted as such, or otherwise addressed within the final BOD report submitted at the DR phase.

1) **Stipulation:** all newly proposed above and below ground structures are to provide 6ft clearance from the public sewer. To ensure this 6ft clearance a 13ft public utility easement shall be dedicated on the entire eastern frontage. The east side easement shall only be encroached with a building overhang located vertically 19 feet or more above the easement.

2) Complete analysis of the 15" section of existing sewer in Miller Road. This report assumes Gentry on the Green will be routed into the 24" Miller Rd line. Confirm with DR phase re-submittal.

**Stipulation:** If Gentry on the Green sends flows into the 15" Miller Road line shared by the proposed development and capacity is insufficient the 15" shall be upsized accordingly by "The Triangle" or via in lieu payment  
3) **Stipulation:** Where underground garage abuts any easement or ROW sail nails shall not protrude into the easement or ROW.

Prepared by:



**Sustainability Engineering Group**  
8280 E. Gelding Drive, Suite 101  
Scottsdale, AZ 85260  
480.588.7226 [www.azSEG.com](http://www.azSEG.com)

Project Number: 200504

Revision Date: October 16, 2020 (Rezoning)

Case No.: 10-ZN-2020

Plan Check No.: TBD

10-ZN-2020  
10/22/20

**Dillon, Levi**

---

**From:** Dillon, Levi  
**Sent:** Tuesday, October 13, 2020 7:15 PM  
**To:** Ali Fakh; Kenya Avina  
**Subject:** RE: Summary of case review discussions today (The Triangle and Sub4)

Thanks. My minor notes in [blue](#). All other items acknowledged. -Levi

---

**From:** Ali Fakh <ALI@azseg.com>  
**Sent:** Tuesday, October 13, 2020 3:07 PM  
**To:** Kenya Avina <kenya@azseg.com>; Dillon, Levi <LDillon@Scottsdaleaz.gov>  
**Subject:** RE: Summary of case review discussions today (The Triangle and Sub4)

**⚠ External Email: Please use caution if opening links or attachments!**

Correction to below:

Regards,

**Ali Fakh**  
Principal



**SEG**

8280 E. Gelding Dr., Suite 101,  
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[Ali@azseg.com](mailto:Ali@azseg.com)

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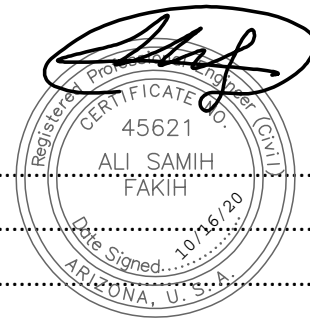
**From:** Kenya Avina <[kenya@azseg.com](mailto:kenya@azseg.com)>  
**Sent:** Tuesday, October 13, 2020 2:51 PM  
**To:** Dillon, Levi <[LDillon@Scottsdaleaz.gov](mailto:LDillon@Scottsdaleaz.gov)>; Ali Fakh <[ALI@azseg.com](mailto:ALI@azseg.com)>  
**Subject:** RE: Summary of case review discussions today (The Triangle and Sub4)

Good afternoon,

Based on our phone call earlier, we discussed the following:

The Triangle:

1. We will provide a 13' easement along the east property line, and will follow through from north to south, unless it encroaches the existing building.
2. The underground structure will be revised to remain outside of the easement; the 1' canopy overhang is not a problem as long as it is **not 6' above**. **We will be providing 19' above (acceptable)**
3. The existing sewer line does not need to be re-routed the and should have 6' clearance from the structure (**this is at the existing triangle building**)
4. Existing sewer line layout will be verified with surveyor, sewer inverts will be provided in exhibits



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APPENDIX II - Preliminary Site / Utility Plan  
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## 1. INTRODUCTION

### 1.1 SUMMARY OF PROPOSED DEVELOPMENT:

The proposed development consists of a mixed residential use with commercial amenities located north of Indian School Road and south of 3<sup>rd</sup> Avenue between Marshall Way and Scottsdale Road in Scottsdale Arizona. An existing inn and several commercial buildings will be razed. The lot area is 144,173 square feet (3.31 acres) per the A.L.T.A. surveys. The proposed structures will have a maximum of seven floors and include approximately 230 residential units, 168 hotel rooms, a 4,000 square foot restaurant, 14,000 square feet of miscellaneous retail/fitness/clubhouse amenities and two pools.

### 1.2 REPORT INTENT:

This preliminary report is provided to support the rezoning from C-2 to D/OC-2 PBD DO-Type 2 and evaluate the existing and proposed wastewater demands compliant to the City's 2017 Design Standards and Policies Manual and the projects impact to the area's wastewater collection system along Indian School Road east to the Miller Road sewer trunk line.

### 1.3 SITE AND LEGAL DESCRIPTION:

The project property consists three land parcels located in SE ¼ of Section 22, Township 2 North, Range 4 East of the Gila and Salt River Base and Meridian, Maricopa County, with the following Assessor Parcel Numbers:

- 173-50-108A, 173-50-034 and 173-50-117B

Refer to **FIGURE 1** for a vicinity map of the project's location with respect to major cross streets.

## 2. DESIGN DOCUMENTATION

### 2.1 DESIGN COMPLIANCE:

The proposed sewer system is designed to meet the criteria of the City of Scottsdale ("the City") Water Resources Department, the Arizona Department of Environmental Quality ("ADEQ"), and Maricopa County Environmental Services Department ("MCESD").

### 2.2 PROCEDURES, POLICIES AND METHODOLOGIES:

The general methodology used to evaluate the wastewater infrastructure consists utilizing the DS+PM unit demands for onsite flows and monitoring flows in offsite sewer mains at two locations as requested by the City's Water Resources Department. Additional area flows for projects recently or in the process of being approved by the City have been provided by City staff and will be added to the monitored flows. Sewer pipe hydraulic capacities will be analyzing to assure conformance to the City's DS+PM criteria.

### 2.3 SOFTWARE ACKNOWLEDGEMENT:

Bentley FlowMaster® Version 8i is the computer software used for analyzing sewer hydraulics.

## 3. EXISTING CONDITIONS

### 3.1 ZONING & LAND USE:

The overall project parcel is zoned C-2. Land uses consist of a motel and commercial/retail/office activities.

### 3.2 EXISTING TOPOGRAPHY, VEGETATION AND LANDFORM FEATURES:

The site has approximately five feet of fall from 3<sup>rd</sup> Avenue to Indian School Road in a south east direction. The site is covered with building and paved parking with only minor landscaping. Refer to **FIGURE 2** for an aerial of the overall project existing conditions.

FIRM Map Number 04013C2235L dated October 16, 2013 indicates this site is designated as Zone "X". As such, it is defined as areas outside of the 0.2% annual chance of flooding. Refer to **FIGURE 3** for an excerpt from the FIRM.

### 3.3 EXISTING SEWER MAINS:

City of Scottsdale Q-S 17-44 includes the proposed development. Q-S 17-45, 17-46 and 16-45 are included to reference the downstream system being evaluated for capacity. Existing sewer lines consist of:

- an 8" vitreous clay pipe (VCP) running north-south along the west and east property lines,
- a 10" vitreous clay pipe (VCP) under Indian School Road from the site and connecting to
- a 15" vitreous clay pipe (VCP) under Miller Road flowing south and connecting to a 24" sewer trunk line near 2<sup>nd</sup> Street.

Refer to **FIGURE 4** for the referenced COS sewer Q-S Maps.

### 3.4 FLOW MONITORING:

Flow monitoring was performed on the 10" Indian School Road sewer just west of Miller Road (manhole #73). The data includes 17 days and three weekends between June 24<sup>th</sup> and July 10<sup>th</sup>, 2020. The location and flow data are included in **APPENDIX I**.

### 3.5 ADDITIONAL AREA FLOWS TO BE INCLUDED:

Scottsdale has approved, or is reviewing, reports for projects that may eventually contribute additional sewer flows to the Indian School and Miller Roads sewer systems.

The following projects are proposed to flow into the 10" Indian School Road :

- The Triangle
- Craftsman Court
- The Marquee (partial)

For reference, wastewater flow from the following potential developments is being directed to the 24" sewer trunk line in Miller Road and are not being evaluated in this report:

- Safari, Phase II
- Blue Sky
- City Center
- Water View
- DC Hotel
- The Mint
- The Maya
- Winfield Scott Hotel
- The Marquee (partial)
- The Gentry (Phase 2)

## 4. PROPOSED CONDITIONS

### 4.1 SITE PLAN:

The property is proposed to be re-developed to include residential apartment and hotel use with supporting commercial, office and retail facilities. Development will include relocated drive entrances from both Indian School Road and 3<sup>rd</sup> Avenue. A new pedestrian crossing is proposed at 3<sup>rd</sup> Avenue connecting the project to Craftsman Court.

### 4.2 PROPOSED SEWER SYSTEM:

Sanitary sewer service will be provided by connections to the existing 8" VCP sewer lines along the west and east drives fronting the property. Grease interceptors will be installed for any proposed food service uses. See **APPENDIX II** for a site plan/utility plan.

### 4.3 SEWER REQUIREMENTS:

The City's design standards govern pipe hydraulics. Sewer should be designed to provide 2.5 fps full flow velocity while not exceeding 15 fps. The design depth over diameter (d/D) ratio of the pipe is 0.65 for pipes 12" and smaller. The d/D ratio may be bumped to 0.80 when accounting for backwash from proposed pools. Service lines will be a minimum 6" diameter at 1% minimum slope.

The Triangle site will propose additional easement along the eastern boundary to extend the existing water and sewer easement from 8' to 13'. Refer to **FIGURE 5** – Proposed Easement Exhibit.

### 4.4 MAINTENANCE RESPONSIBILITIES:

The on-site sewer service lines will be private and maintained by the property owner. Any grease interceptors provided will be owned and maintained by the property owner.

## 4. SEWER SYSTEM COMPUTATIONS

### 5.1 ONSITE SEWER DEMANDS:

The proposed development at the site consists of residential apartment units including a community pool, a private pool and commercial/office/retail facilities. The associated DS+PM demands along with the peaking factors are shown in Table 1 below. Note: only one pool is included in the demand calculation as this will not be backwashed at the same time. A summary of the total sewer demands for The Triangle site are presented below in Table 2.

**Table 1: COS DESIGN CRITERIA BY DEMAND TYPE**

Land Use	Average Day Demand (gpd)	Unit	Design Peaking Factor
High Density Residential	140	per unit	4.5
Hotel	380	per room	4.5
Restaurant	1.2	per sq. ft.	6
Retail amenities	0.5	per sq. ft.	3
Pool Backwash	144,000	per pool	n/a

**Table 2: ONSITE SEWER DEMAND CALCULATIONS PER DS+PM**

Land Use	Count	Unit	ADD per Unit (gpd)	Avg. Day Demand (gpm)	Peak Demand (gpm)
B-1 Hotel	168	Rooms	380	44.3	199.5
B-1 Restaurant	4,000	Sq. Ft.	1.2	3.3	20.0
B-2/3 High Density Residential	220	Units	140	21.4	96.3
B-4 Townhomes	2	Units	140	0.2	0.9
B-5 Townhomes	2	Units	140	0.2	1.2
B-6 Townhomes	6	Units	140	0.6	1.8
Ex - Retail amenities	14,000	Sq. Ft.	0.5	4.9	14.6
Pool Backwash	1	EA	144,000	100.0	100.0
Totals				174.9	434.1

\*Note: unit count has increased from pre-app 167-192

The proposed 6" sewer service lines per **APPENDIX I** have a full flow capacity of 251.8 gpm each. Splitting the flow from The Triangle, 50/50, results in 217.35 gpm to each of the 8" pipes along the west and east property lines. It should be noted two services are proposed to each of the 8" pipes.

## 5.2 SOFTWARE ANALYSIS:

Bentley FlowMaster® Version 8i is the computer software tool used in this study.

Analysis input parameters included the following:

1. Pipe diameters (inches)
2. Pipes slopes
3. System demands (gpm)
4. Piping is PVC Manning's N-Values (n = 0.013)

Output parameters included but were not limited to:

1. Flow rate (gpm)
2. Velocities (fps)
3. Percent Full (d/D)




### 5.3 OFFSITE SEWER DEMANDS:

#### 8" Sewer Lines Adjacent to The Triangle's Property Lines:

COS Water Resources staff has provided a 74 gpm existing flow in the Indian School Road sewer system just east of The Triangle site and recommends a 60/40 (east/west) split in evaluating the proposed impact to the two 8" sewers adjacent to The Triangle site. Table 3 summarizes the offsite and onsite sewer demands in the two 8" sewer pipe. Flow from the Triangle site's six buildings was split 50/50 for purposes of the zoning submittal.

**Table 3 - 8" SEWER LINES ADJACENT TO PEG SCOTTSDALE**

	Ex Flow (gpm)	PEG site (gpm)	Total Flow (gpm)	Depth (in)	Velocity (fps)	d/D
West line	29.6	217.35	246.95	3.3	3.9	0.41
East line	44.4	217.35	261.75	3.4	4	0.43
Allowable			505.8	5.2	4.7	0.65



As described in Section 3.5, wastewater from Craftsman Court and The Triangle will enter the Indian School Road 10" pipe via the existing 8" sewers adjacent to The Triangle site. Partial flow from The Marquee will enter the 10" Indian School Road sewer at Buckboard. Table 4 accounts for an allowable flow reduction is based on the distance of a project from the monitored manhole with a maximum allowable reduction of ten percent.

**Table 4: ADDED FLOWS TO THE 10" INDIAN SCHOOL RD MONITORED RESULTS**

Project	Peak Flow (gpm)	Distance to Point of Analysis* (mi)	Allowable Reduction (%)	Resulting Peak Flow (gpm)
The Triangle (W/ Pool Backwash)	434.1	0.5	5.0	412.4
Craftsman Court	4.0	0.7	7.0	3.7
The Marquee	166.5	0.8	8.0	153.2
Monitored Manhole	128.8	0.0	0.0	128.8
Total Peak Flow				698.1

\* Analysis point is monitored manhole on Indian School Road west of Miller Road

These flows within the 10" Indian School Road sewer line have been verified by COS Water Operations staff to discharge into the 24" sewer trunk line at Miller Road.

Referring to **APPENDIX III**, Table 5 summarizes flow hydraulics in the Indian School Road sewer line with and without The Triangle pool backwash.

incorrect, there is a section of 15" sewer where flows discharge prior to the 24"

minor exceedance allowed, no more future development flows into 10" allowed

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**Table 5 - 10" INDIAN SCHOOL ROAD LINE HYDRAULIC CAPACITY AT MONITORED MH**

Scenario	Sewer Demand (gpm)	n-value	Slope (ft/ft)	Depth (in)	d/D	Velocity (fps)	Available Capacity (gpm)
Peak Flow w/ Pool - Table 3	698.1	0.013	0.0049	8.1	0.81	3.2	-
d/D=0.8 Capacity	-	0.013	0.0049	8.0	0.80	3.2	672.8
Peak Flow w/o Pool - Table 3	603.1	0.013	0.0049	7.1	0.71	3.2	-
d/D=0.65 Capacity	-	0.013	0.0049	6.5	0.65	3.1	520.7

(1) Pool flow = 95 gpm with 5% reduction for distance from monitored manhole

The Atwell Report for Gentry on the Green recommends a new 15" sanitary sewer along Indian School Road east of Miller Road. This pipe would need to be connected to the existing 24" sewer trunk line in Miller Road and thus would not be contributing to the 10" sanitary sewer system in Indian School Road to the west of Miller Road. Alternatively, SEG has identified a new potential sewer along Montecito Avenue between Miller and Parkway Avenue that would divert sewer flows from a future project (Gentry on the Green) to Miller Road. Either case frees up capacity in the existing 10" sewer system at the Indian School Road/Miller Road Intersection. ✓

The short reach of 15" Miller Road pipe has a d/D = 0.7 capacity of 3,467 gpm and connects to the 24" Miller Road pipe with a d/D = 0.7 capacity of 7,837 gpm (see APPENDIX III).

Stipulation

## 6. SUMMARY

### 6.1 SUMMARY OF PROPOSED SEWER IMPROVEMENTS:

- Onsite and offsite sewer mains were evaluated in accordance with City of Scottsdale's design standards and policies<sup>2</sup> and direction received from COS Water Resources staff.
- The allowable d/D criteria are slightly exceeded. OK ✓
- Backwater valves will be installed on any service line where the upstream manhole is higher than the finish floor of the building being served.
- Privately owned and maintained grease interceptors will be installed to serve all food preparation facilities.

### 6.2 PROJECT SCHEDULE:

The infrastructure and buildings are proposed to be constructed in a single phase.

## 7 SUPPORTING MAPS

### 7.1 SITE UTILITY PLAN

Refer to Preliminary Site Plan / Utility Plan in APPENDIX II.

## 8 REFERENCES

1. *COS QS Sewer Plan number 17-45*
2. *City of Scottsdale Design Standards & Policies Manual, 2017 (Chapter 7 – Sewer)*

## *FIGURES*

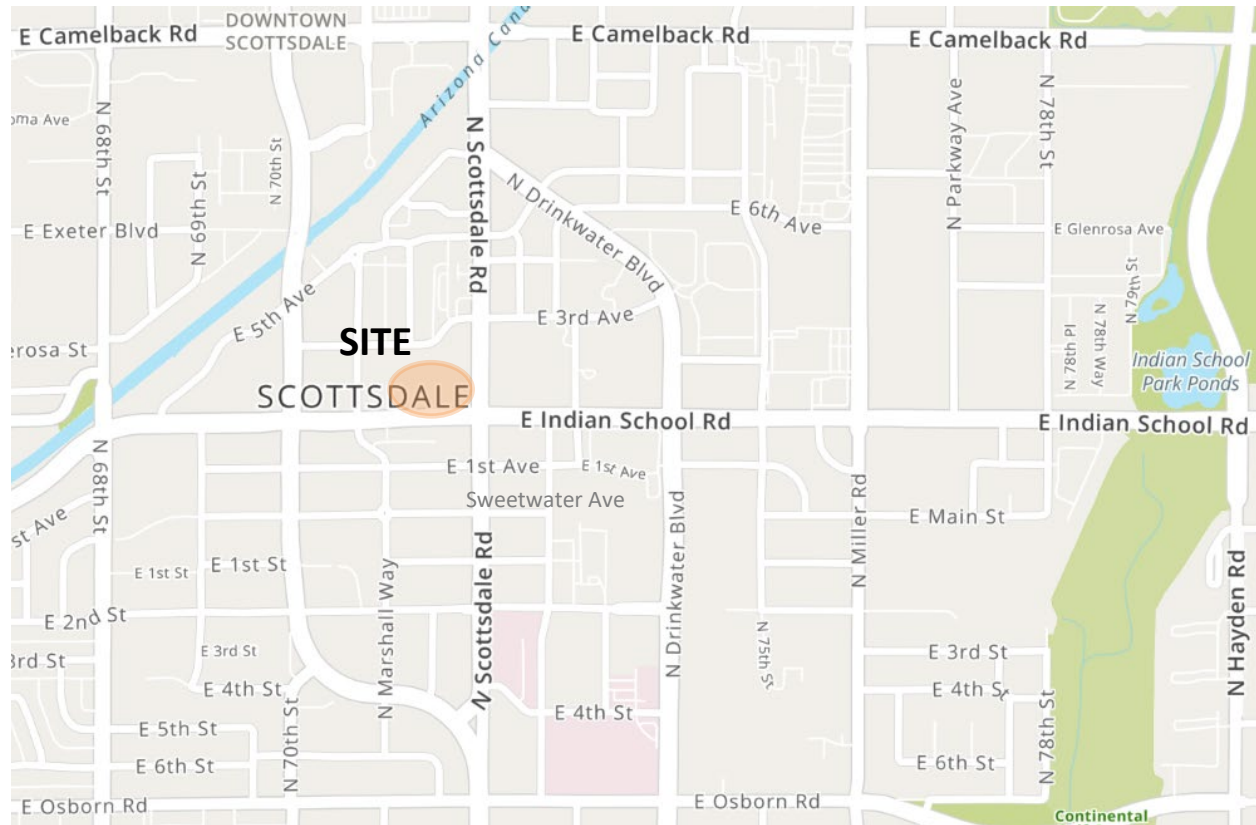
***FIGURE 1 - Vicinity Map***

***FIGURE 2 - Aerial***

***FIGURE 3 - FIRM Excerpt***

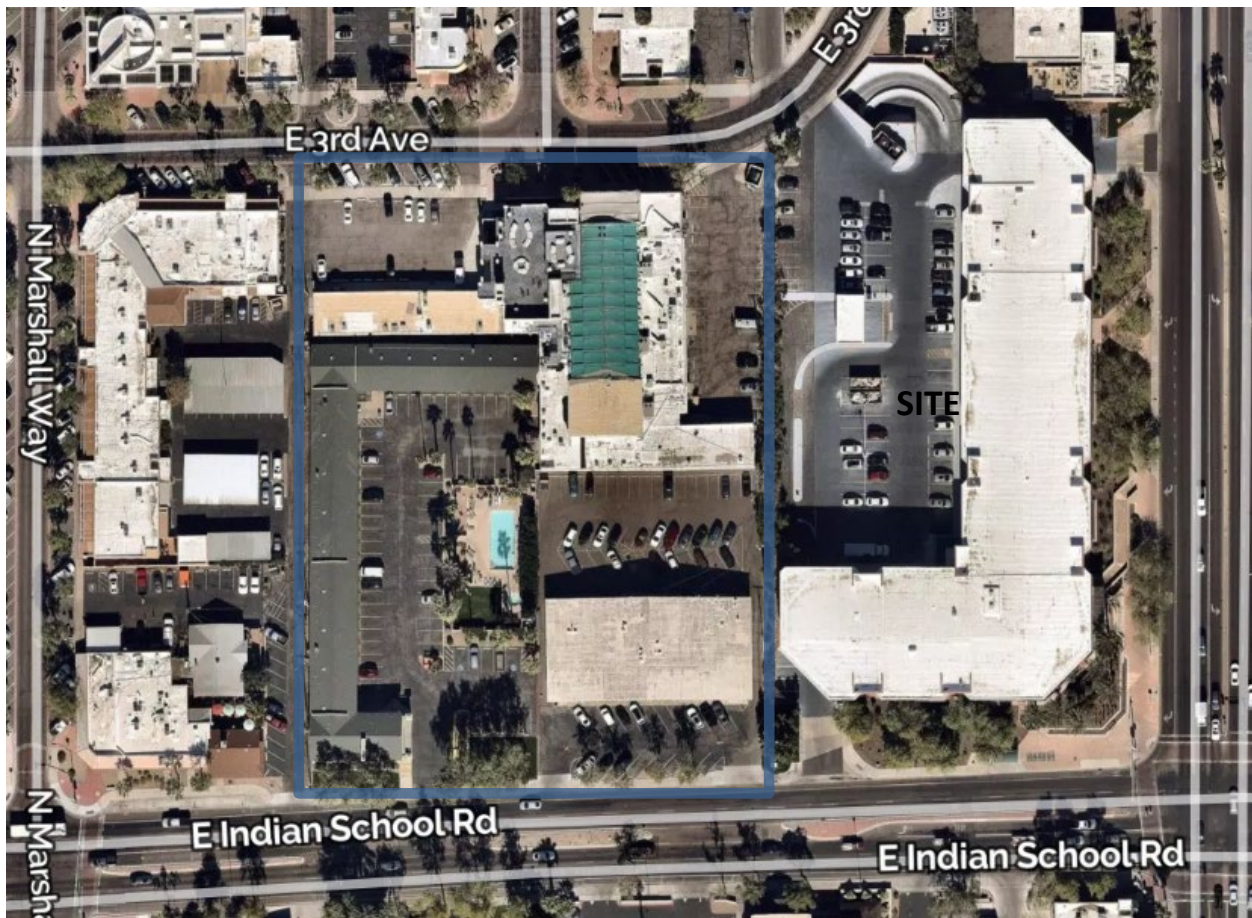
***FIGURE 4 - Sewer QS 17-44, -45, -46, 16-45***

***FIGURE 5 - Proposed Easement Exhibit***



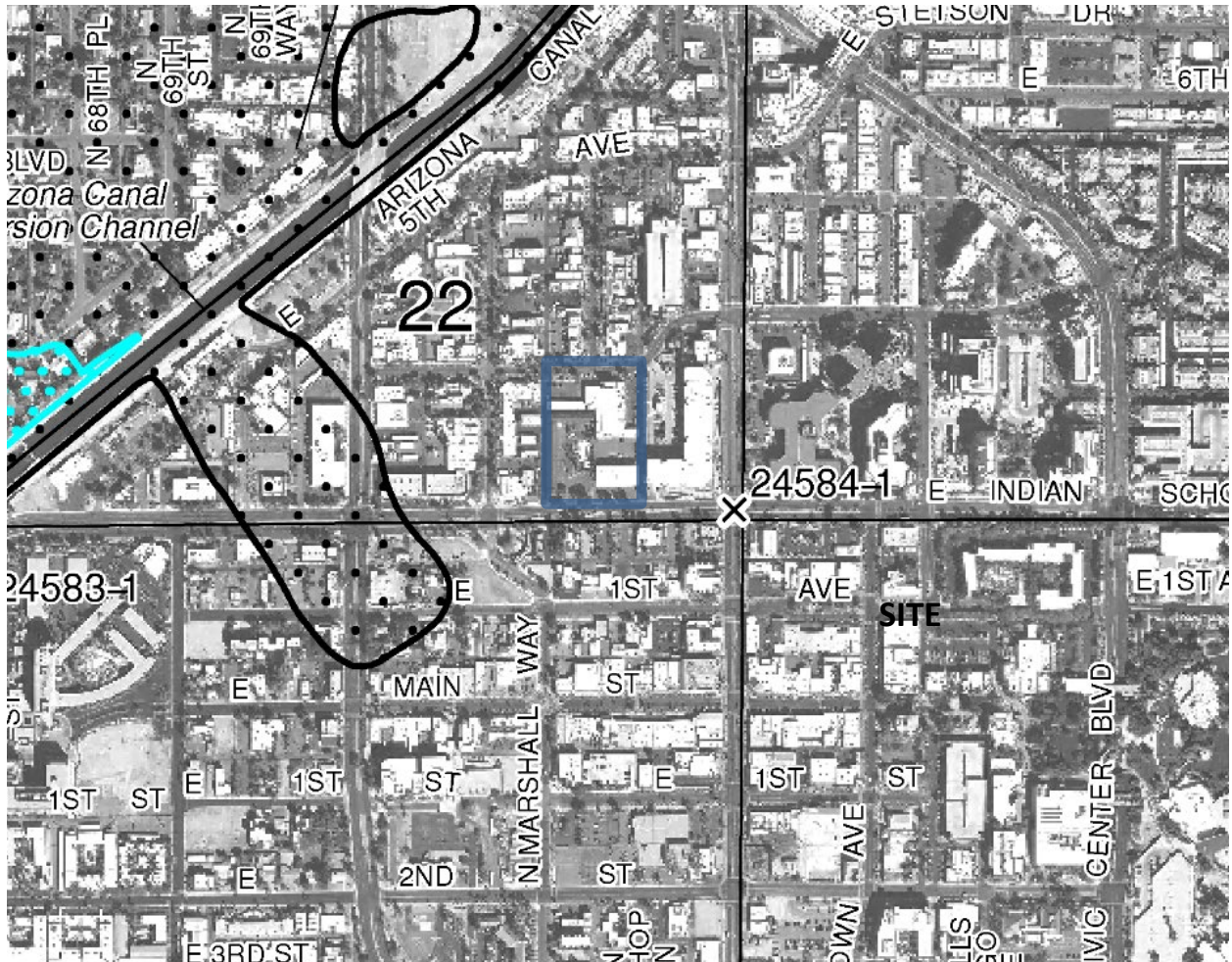
**FIGURE 1 – Vicinity Map**

8280 E. Gelding Dr., Suite 101  
Scottsdale, AZ 85260



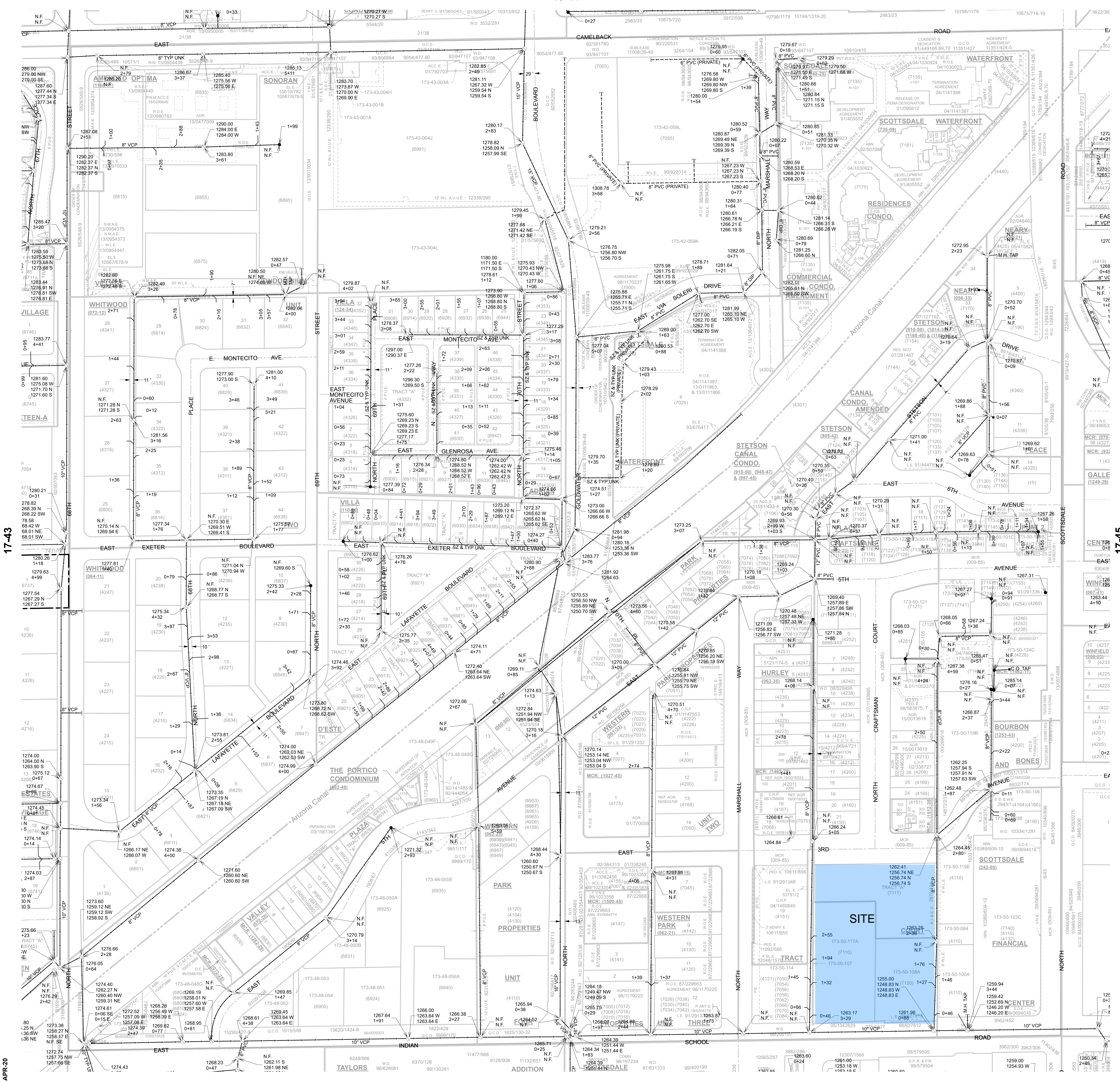
**FIGURE 2 - Aerial**





**FIGURE 3 – FEMA FIRM  
Excerpt from 04013C2235L**





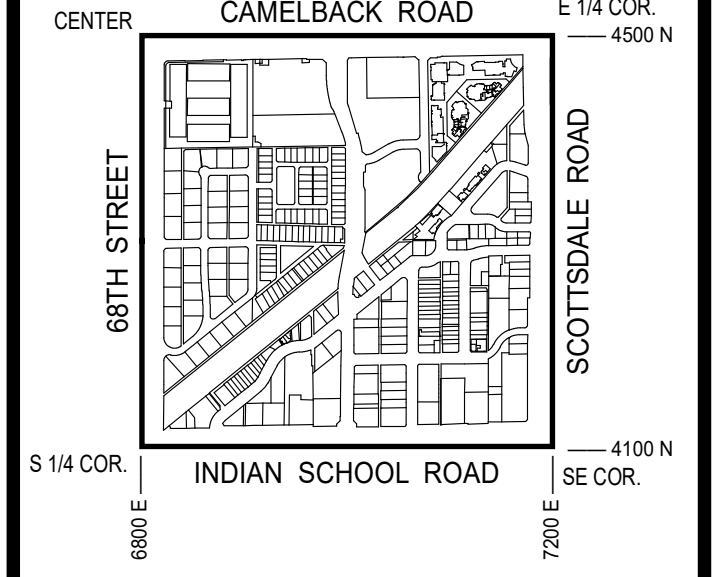
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 GIS DEPARTMENT AT (480) 312-7792.

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 FLATTENED TO GROUND. WHERE NO CORNER WAS FOUND  
 THE DIMENSIONS ARE GIVEN TO CALCULATED SECTION  
 CORNERS AND ARE NOT AS CALCULATED ON THE MAP.

**LEGEND:**

- Cleanout
- Lift Station
- Manhole
- Non-GPS Point
- Plug
- Sewer Service Point
- Sewer Tap Point
- Sewer Valve
- Treatment Plant
- Sewer Main - Gravity
- Sewer Main - Force
- Sewer Main - Private

**VICINITY MAP**



**NORTH**

SCALE: 1" = 100'



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

**SEWER  
 QUARTER SECTION MAP**

**17-44**

SE 1/4 SEC. 22 T2N R4E

**FIGURE 4**

**CITY OF SCOTTSDALE**  
 SCOTTSDALE GEOGRAPHIC  
 INFORMATION SYSTEMS  
 3623 North Drinkwater Boulevard  
 Scottsdale, Arizona 85251

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 THE CITY OF SCOTTSDALE  
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 10-2N-20-20

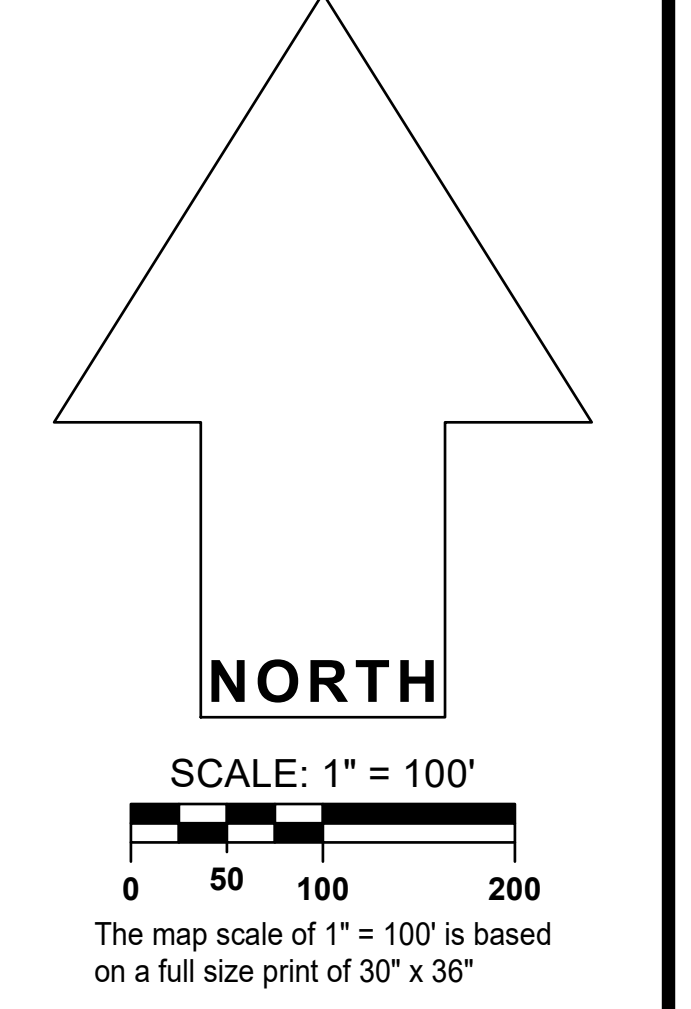
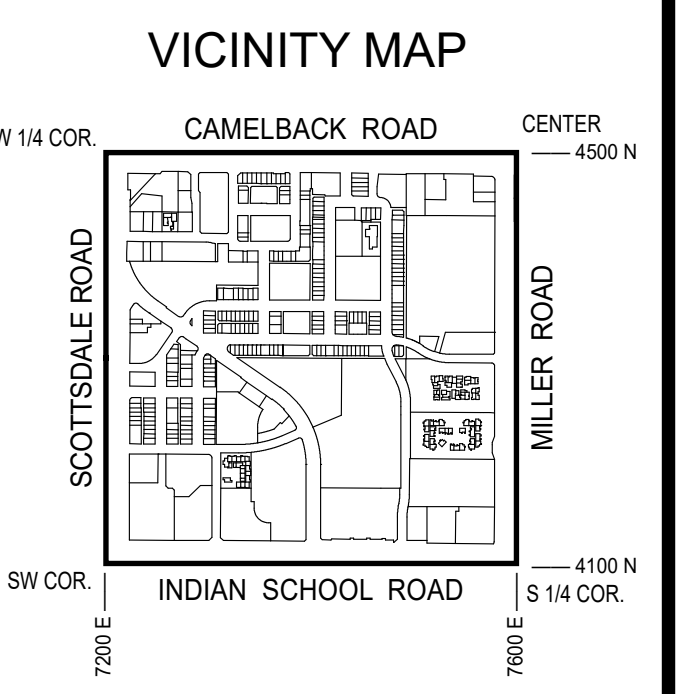


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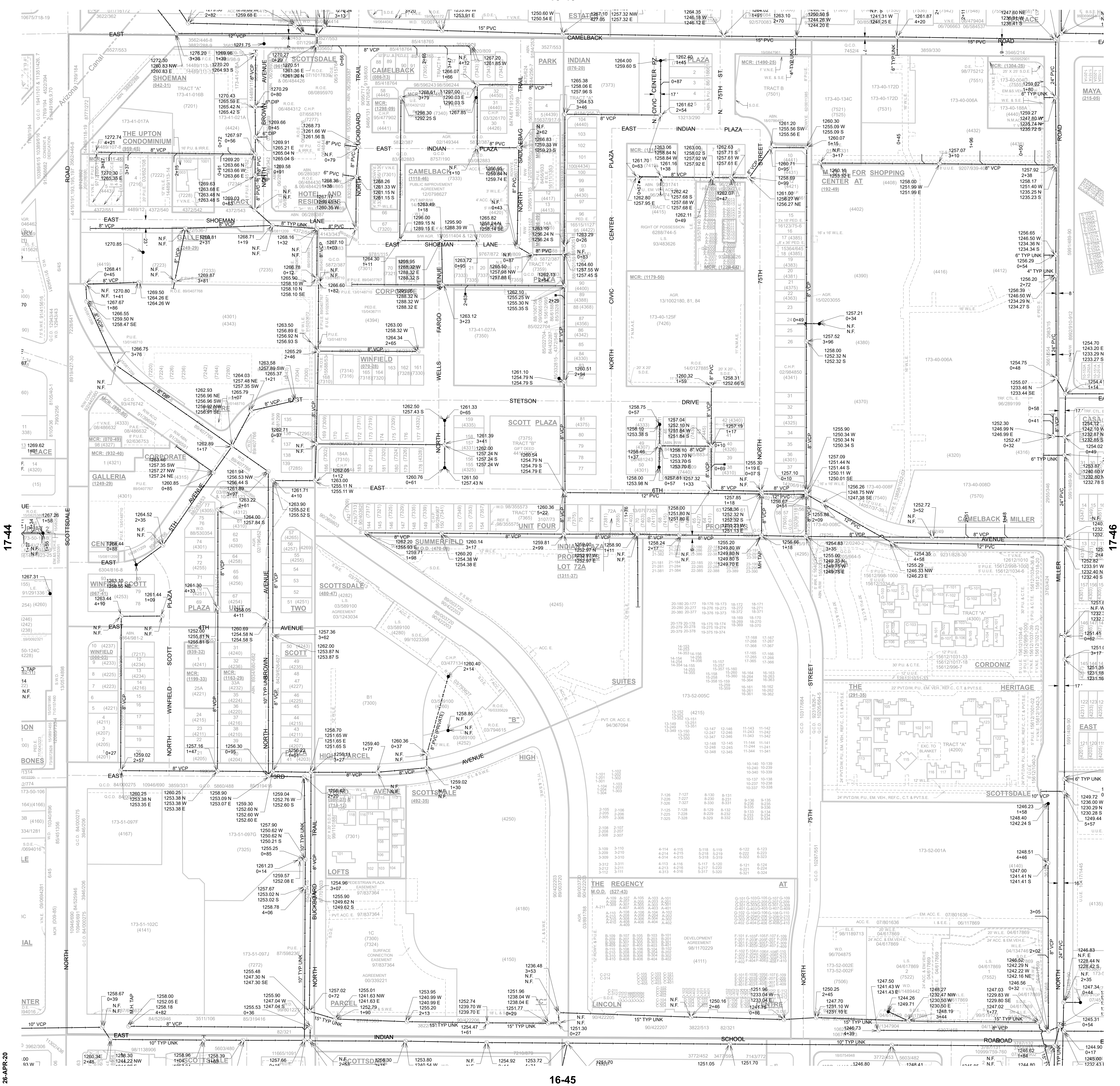
**LEGEND:**

- Cleanout
- Lift Station
- Manhole
- Non-GPS Point
- Plug
- Sewer Service Point
- Sewer Tap Point
- Sewer Valve
- Treatment Plant
- Sewer Main - Gravity
- Sewer Main - Force
- Sewer Main - Private



**SEWER**  
**QUARTER SECTION MAP**  
**17-45**  
 SW 1/4 SEC. 23 T2N R4E

**FIGURE 4**

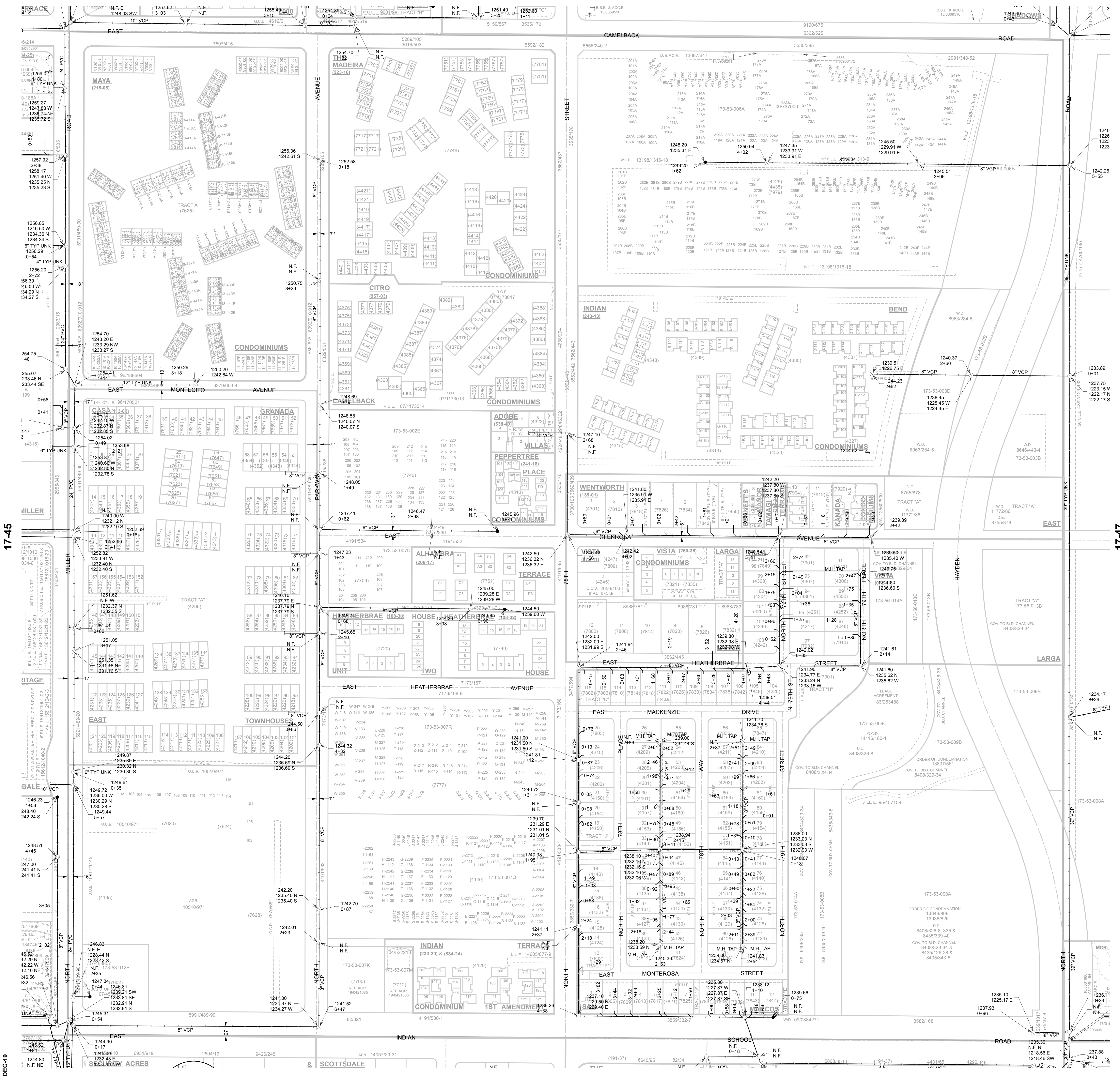


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26-APR-20





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**LEGEND:**

- Cleanout
- Lift Station
- Man-Hole
- Non-GP Point
- Plug
- Sewer Service Point
- Sewer Tap Point
- Sewer Valve
- Treatment Plant
- Sewer Main - Gravity
- Sewer Main - Force
- Sewer Main - Private

**VICINITY MAP**

**NORTH**

SCALE: 1" = 100'

0 50 100 200  
 The map scale of 1" = 100' is based on a full size print of 30" x 36"

**SEWER QUARTER SECTION MAP**

# 17-46

SE 1/4 SEC. 23 T2N R4E

**FIGURE 4**

**CITY OF SCOTTSDALE**

**SCOTTSDALE GEOGRAPHIC INFORMATION SYSTEMS**  
 3623 North Drinkwater Boulevard  
 Scottsdale, Arizona 85251

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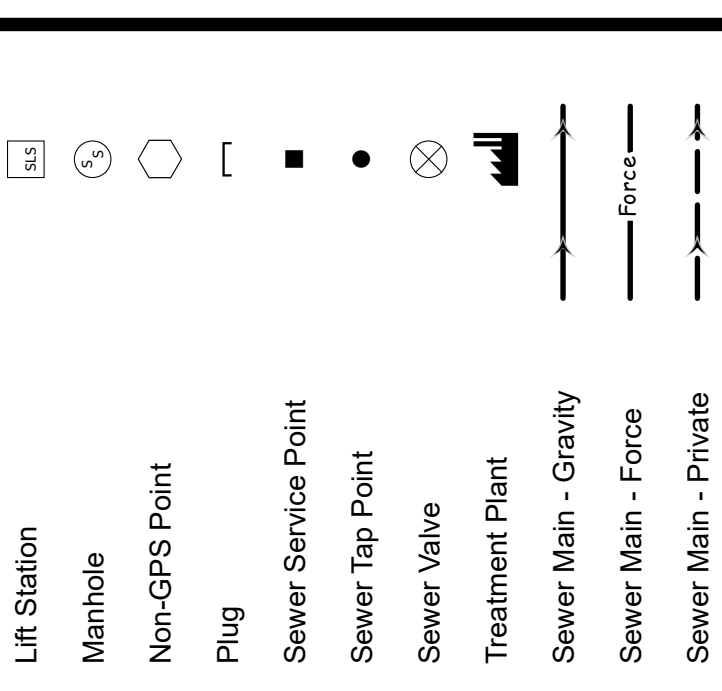
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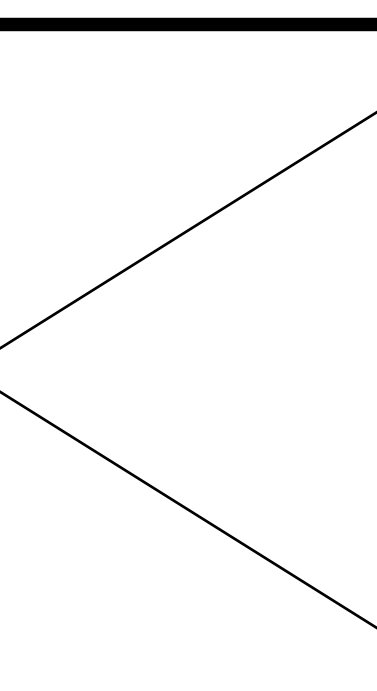
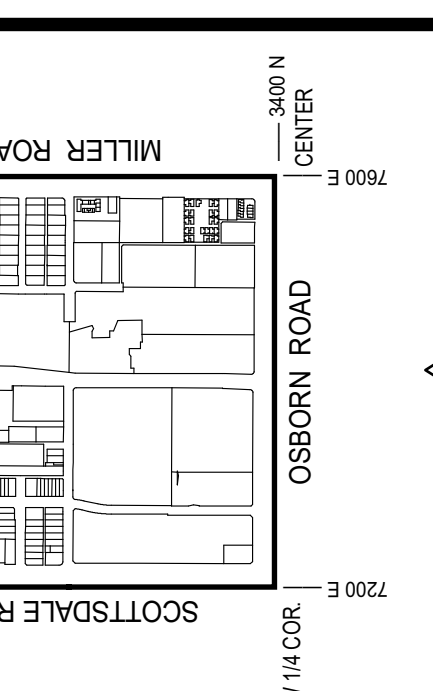
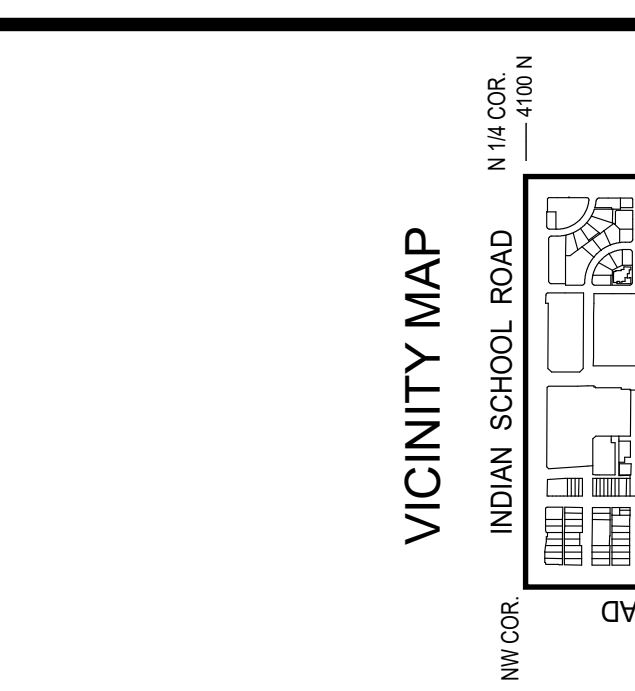


**GENERAL NOTES:**

- THIS IS A COMPUTER GENERATED DRAWING. FOR ANY CHANGES TO BE MADE, CONTACT THE CITY OF SCOTTSDALE GIS DEPARTMENT AT (480) 342-7762.
- THE SECTION LINE BEARING AND DISTANCE ARE BASED ON THE CITY OF SCOTTSDALE GPS SURVEY OF SEPTEMBER 1991. BEARINGS ARE IN DD GRD AND DISTANCES ARE IN FEET. THE DIMENSIONS ARE GIVEN TO CALCULATED SECTION CORNERS AND ARE NOT TO BE CALCULATED ON THE MAP.

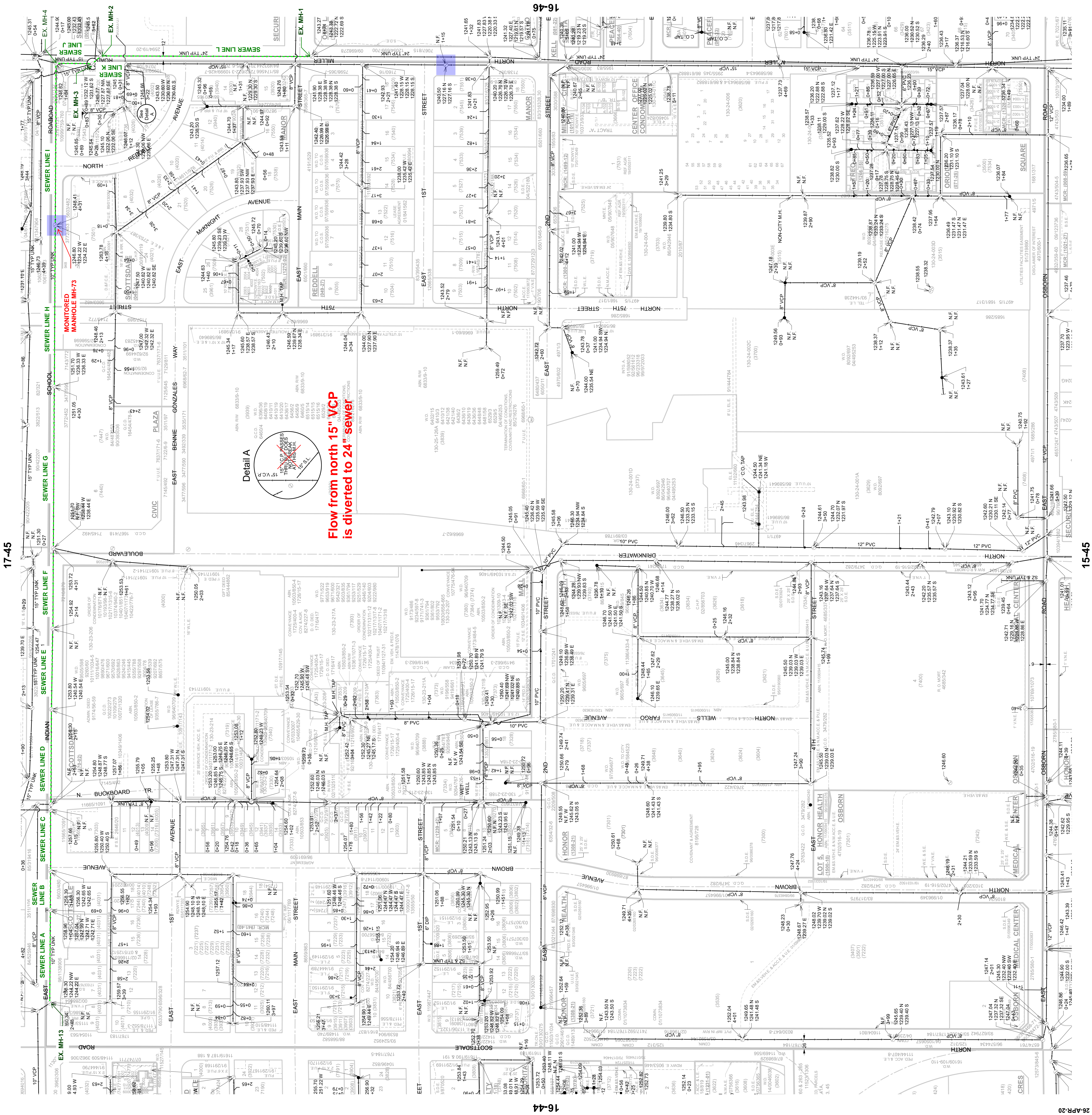


Street	Sewer Size	Slope
(ID)	(inch)	(ft/ft)
A	10	0.006
B	10	0.006
C	10	0.0049
D	10	0.0049
E	10	0.0049
F	10	0.0049
G	10	0.0049
H	10	0.0049
I	10	UNKNOWN
J	15	UNKNOWN
K	15	UNKNOWN
L	24	0.0085



**SEWER**  
**QUARTER SECTION MAP**  
**16-45**  
**FIGURE 4**  
NW 1/4 SEC. 26 T2N R4E

**SCOTTSDALE GEOGRAPHIC INFORMATION SYSTEMS**  
3820 North Drinkwater Boulevard  
Scottsdale, Arizona 85251



17-45 16-44 16-44 15-45

26-APR-20

THE CITY OF SCOTTSDALE

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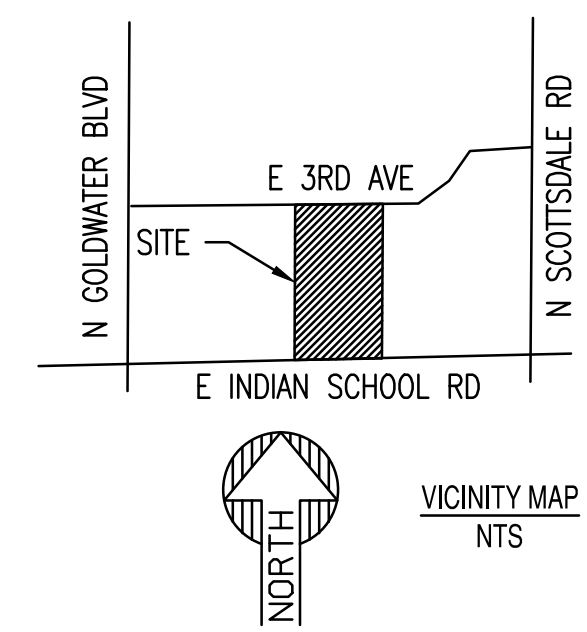


**CIVIL ENGINEER:**  
 SEG  
 8280 E. GELDING DR, SUITE #101  
 SCOTTSDALE, AZ 85260  
 480-588-7226  
 ATTN: ALI FAKIH

**CLIENT:**  
 PEG DEVELOPMENT  
 180 N. UNIVERSITY AVE  
 SUITE 200, PROVO UT 84601  
 801-655-1998  
 ATTN: MATT KRAMBULE

**ARCHITECT:**  
 GENSLER  
 2575 E. CAMELBACK RD  
 SUITE 175, PHOENIX AZ 85016  
 602-253-4900  
 ATTN: JOHANNA COLLINS

**THE TRIANGLE**  
 7120 E. INDIAN SCHOOL ROAD SCOTTSDALE, AZ 85251  
 PROPOSED EASEMENT EXHIBIT



**THE TRIANGLE**

7120 E INDIAN SCHOOL RD,  
 SCOTTSDALE, AZ 85251

- CASE PRE-APP NUMBER -  
 63-PA-2020

**Gensler**

2575 E Camelback Road Suite 175  
 Phoenix, AZ 85016  
 United States  
 Tel 602.523.4900  
 Fax 602.523.4949

**SYDNOR**

4806 N 78TH Place  
 Scottsdale, AZ 85251  
 United States  
 Tel 480.206.4593

Date	Description
10/16/20	Resubmittal



8280 E. GELDING DRIVE  
 Suite 101  
 Scottsdale, AZ 85260  
 United States  
 Tel 480.588.7226

**PROPOSED LEGEND:**

- PROPERTY LINE
- PROPOSED ACCESS EASEMENT
- PROPOSED WATER AND SEWER EASEMENT
- UNDERGROUND PARKING
- EXISTING WATER EASEMENT
- PROPOSED R.O.W.

Seal / Signature

**NOT FOR CONSTRUCTION**

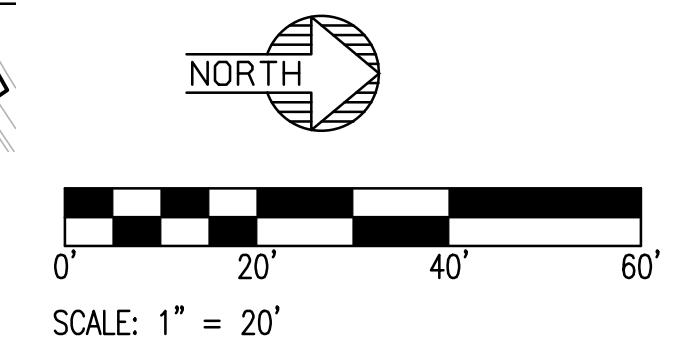
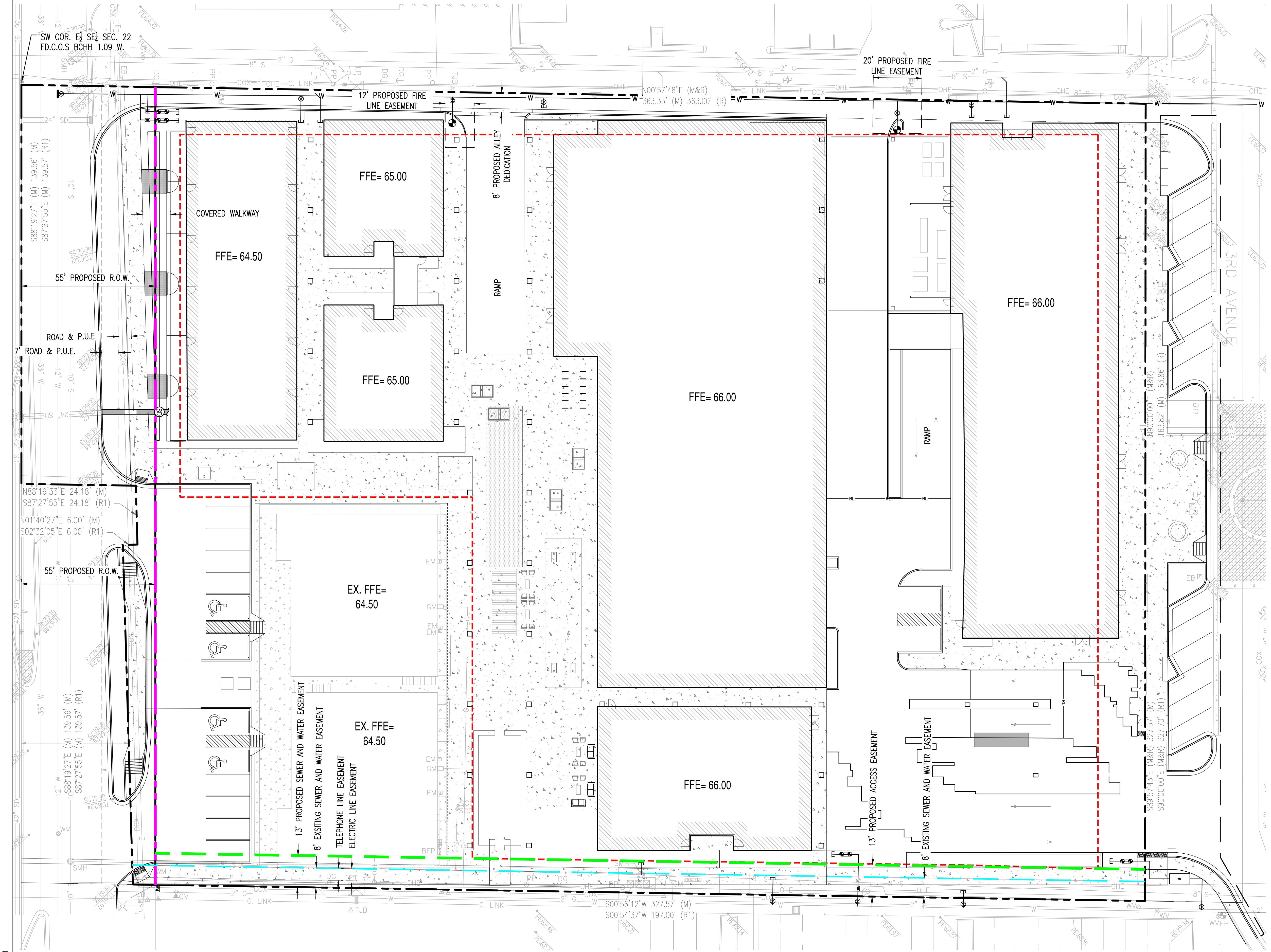
Project Name  
 3RD AVENUE+INDIAN SCHOOL ROAD - SCOTTSDALE, AZ

Project Number  
 200504 (SEG)

Description  
 PROPOSED EASEMENT EXHIBIT

Scale  
 As indicated

FIGURE 5



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10-ZN-2020  
10/22/20

## *APPENDICIES*

***I – Monitored Sewer Flow Reports***

***II – Site Plan / Utility Plan***

***III – Sewer Pipe Hydraulics***



*"LEED®ing and Developing Smart Projects"*

# **APPENDIX I - Monitored Sewer Flow Report**

*8280 E. Gelding Dr., Suite 101  
Scottsdale, AZ 85260*

Sustainability Engineering Group

[info@azSEG.com](mailto:info@azSEG.com) 480.588.7226 [www.azSEG.com](http://www.azSEG.com)

**10-ZN-2020**  
10/22/20



## Flow Monitoring Site Report

**Project Number:** SL861 SEG Engineering

### **Site Location & Traffic Control**

**Site reference ID:** QS16-45, MH 73

**Monitoring Address:** On Indian School, 100 yards East of 75<sup>th</sup> St., East bound fast lane

**Traffic Control Requirements:** YES, provided by Action Barricade Company

### **Site Structure / Channel/Pipe**

**Installation structure:** 4ft. Manhole, Brick

**Structure Size/dimensions:** 4' with ring and cover

**Rim to pipe invert:** 157.675"

**Flow configuration:** Pipe

**Flow Direction:** East

**Main Pipe size inches:** 10"

**Type of Pipe:** VCP

**Scum line:** 4"

**Pipe/Channel Condition:** Intact

**Inside the pipe:** Reasonably clean

**Lateral Pipe(s):** No

### **Logger Sensors Monitoring**

**Meters/Loggers:** FL900

**Sensor:** Flo-Dar (AV) noninvasive

**Units Measurement:**

GPM (gallons per minute)

GPD (gallons per day)

Level (inches)

Velocity FPS (feet per second)

**Data logging intervals (minutes and or Hours):** 5 minute intervals

**Remote monitoring:** N/A



## Flow Monitoring Site Report – SEG Engineering

**Duration of monitoring Days:** Nine (9) day, including two (2) weekends

**Data Start Date/Zulu Time:** 06-24-2020, 13:00

**Data Ending Date/Zulu Time:** 07-10-2020, 8:00

**Equipment Removal Date/Time:** 07-10-2020, 8:50

### General Notes:

RDH performed a Confined Space Entry for Installation and Calibration of flow monitoring equipment. The 10" pipe had no debris with about 3.5" of flow with good velocity at the time of the installation. Based on the scum line the flows appear to be in the lower 4" of the pipe with minimal scum build up. The sensor was mounted in the upstream pipe. The manhole appears to be in good condition with thin rusted steps and there were no equipment errors. Below are photos and flow data summaries showing Level, Velocity, Flow and attached excel raw data file.





## Flow Monitoring Site Report – SEG Engineering





## Flow Monitoring Site Report – SEG Engineering

Sustainability MH73 Level (in.)			
Date	Maximum	Minimum	Average
Wednesday, June 24, 2020	3.22	2.06	2.69
Thursday, June 25, 2020	3.42	1.83	2.60
Friday, June 26, 2020	3.24	2.07	2.63
Saturday, June 27, 2020	3.03	1.77	2.43
Sunday, June 28, 2020	2.77	1.77	2.27
Monday, June 29, 2020	3.26	1.95	2.48
Tuesday, June 30, 2020	3.29	1.74	2.43
Wednesday, July 1, 2020	3.27	2.01	2.57
Thursday, July 2, 2020	3.46	2.04	2.65
Friday, July 3, 2020	3.42	1.95	2.74
Saturday, July 4, 2020	2.94	2.03	2.42
Sunday, July 5, 2020	2.83	1.82	2.24
Monday, July 6, 2020	3.19	1.78	2.47
Tuesday, July 7, 2020	3.36	1.92	2.52
Wednesday, July 8, 2020	3.37	1.74	2.61
Thursday, July 9, 2020	3.53	1.99	2.69
Friday, July 10, 2020	2.99	2.21	2.61

MH73 Period Summary: Level				
Measures	Value	Unit	Date	Time
Max.	3.53	in.	Thursday, July 9, 2020	2:55 PM
Min.	1.74	in.	Wednesday, July 8, 2020	1:50 AM
Avg.	2.52	in.		

\*Data begins at 1:00pm on June 24th and ends at 8:00am on July 10th.



## Flow Monitoring Site Report – SEG Engineering

Sustainability MH73 Velocity (fps)			
Date	Maximum	Minimum	Average
Wednesday, June 24, 2020	1.58	1.12	1.4
Thursday, June 25, 2020	1.65	1.04	1.36
Friday, June 26, 2020	1.57	1.08	1.33
Saturday, June 27, 2020	1.54	0.98	1.29
Sunday, June 28, 2020	1.42	1.00	1.23
Monday, June 29, 2020	1.59	1.06	1.31
Tuesday, June 30, 2020	1.55	0.95	1.27
Wednesday, July 1, 2020	1.57	1.02	1.32
Thursday, July 2, 2020	1.56	1.01	1.30
Friday, July 3, 2020	1.56	0.93	1.29
Saturday, July 4, 2020	1.46	1.03	1.24
Sunday, July 5, 2020	1.40	0.93	1.16
Monday, July 6, 2020	1.55	0.94	1.24
Tuesday, July 7, 2020	1.65	0.97	1.25
Wednesday, July 8, 2020	1.59	0.99	1.31
Thursday, July 9, 2020	1.67	1.06	1.34
Friday, July 10, 2020	1.48	1.11	1.29

MH73 Period Summary: Velocity				
Measures	Value	Unit	Date	Time
Max.	1.67	fps.	Thursday, July 9, 2020	2:55 PM
Min.	0.93	fps.	Friday, July 3, 2020	1:45 AM
Avg.	1.29	fps.		

\*Data begins at 1:00pm on June 24th and ends at 8:00am on July 10th.



## Flow Monitoring Site Report – SEG Engineering

Sustainability MH73 Flow				
Date	Maximum (gpm)	Minimum (gpm)	Average (gpm)	Total (gal)
Wednesday, June 24, 2020	105.32	40.76	75.41	49,772.80
Thursday, June 25, 2020	117.30	32.91	71.13	102,424.40
Friday, June 26, 2020	107.48	39.53	69.37	99,890.10
Saturday, June 27, 2020	96.72	28.48	60.85	87,630.80
Sunday, June 28, 2020	78.66	29.19	52.00	74,882.80
Monday, June 29, 2020	110.12	36.40	63.28	91,125.30
Tuesday, June 30, 2020	109.06	28.08	60.09	86,533.80
Wednesday, July 1, 2020	109.38	36.44	66.74	96,099.20
Thursday, July 2, 2020	117.17	36.44	68.87	99,174.60
Friday, July 3, 2020	112.99	31.20	71.70	103,251.90
Saturday, July 4, 2020	86.91	37.12	57.34	82,566.20
Sunday, July 5, 2020	79.70	28.49	48.21	69,421.20
Monday, July 6, 2020	104.04	27.75	60.47	87,081.60
Tuesday, July 7, 2020	119.09	35.14	61.83	89,030.80
Wednesday, July 8, 2020	112.87	28.33	69.17	99,610.50
Thursday, July 9, 2020	128.82	36.49	73.07	105,224.50
Friday, July 10, 2020	91.03	44.83	65.97	15,832.30

MH73 Period Summary: Flow				
Measures	Value	Unit	Date	Time
Max.	128.82	gpm	Thursday, July 9, 2020	2:55 PM
Min.	27.75	gpm	Monday, July 6, 2020	2:30 AM
Avg.	63.98	gpm		
Total	1,439,553.00	gal		

\*Data begins at 1:00pm on June 24th and ends at 8:00am on July 10th.

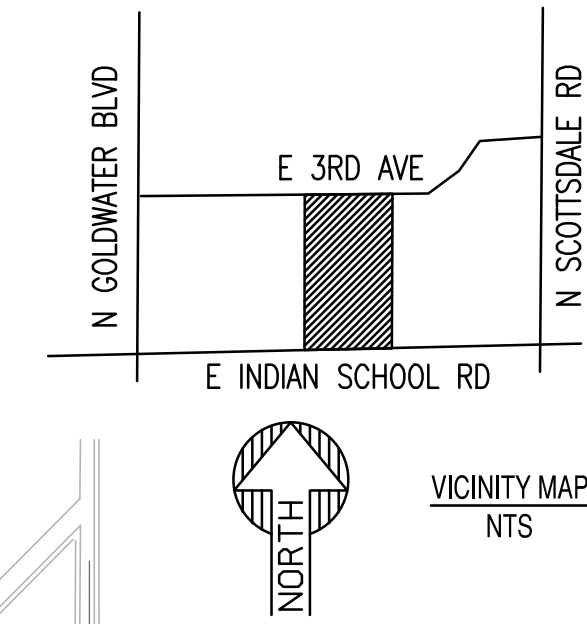


**CIVIL ENGINEER:**  
 SEG  
 8280 E. GELDING DR, SUITE #101  
 SCOTTSDALE, AZ 85260  
 480-588-7226  
 ATTN: ALI FAKIH

**CLIENT:**  
 PEG DEVELOPMENT  
 180 N. UNIVERSITY AVE  
 SUITE 200, PROVO UT 84601  
 801-655-1998  
 ATTN: MATT KRAMBULE

**ARCHITECT:**  
 GENSLER  
 2575 E. CAMELBACK RD  
 SUITE 175, PHOENIX AZ 85016  
 602-253-4900  
 ATTN: JOHANNA COLLINS

**THE TRIANGLE**  
 7120 E. INDIAN SCHOOL ROAD SCOTTSDALE, AZ 85251



**THE TRIANGLE**  
 7120 E INDIAN SCHOOL RD,  
 SCOTTSDALE, AZ 85251

- CASE PRE-APP NUMBER -  
 63-PA-2020

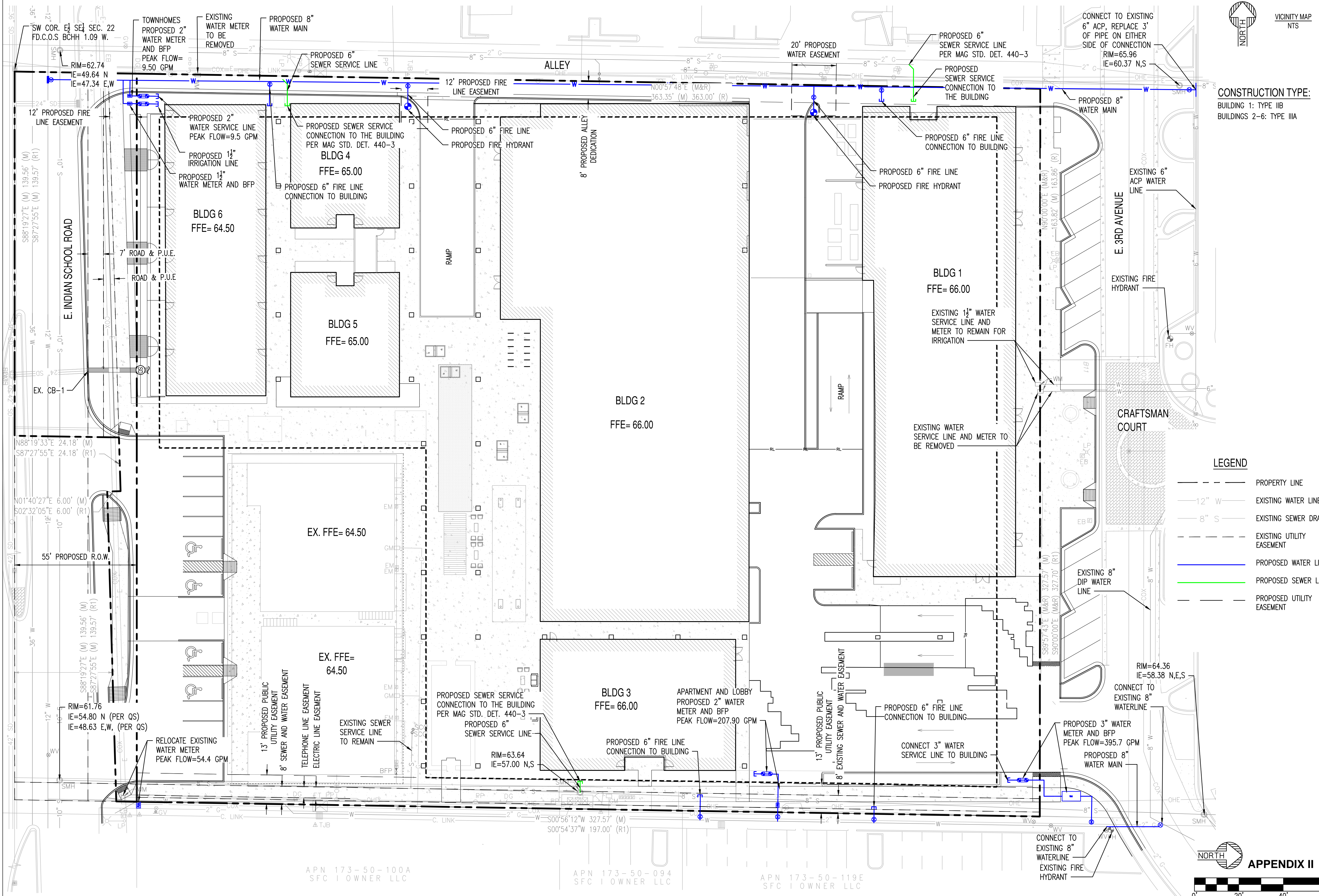
**GenSLer**

2575 E Camelback Road Suite 175  
 Phoenix, AZ 85016  
 United States  
 Tel 602.523.4900  
 Fax 602.523.4949

**SYDNOR**

4806 N 78TH Place  
 Scottsdale, AZ 85251  
 United States  
 Tel 480.206.4593

**CONSTRUCTION TYPE:**  
 BUILDING 1: TYPE IIB  
 BUILDINGS 2-6: TYPE IIIA



**LEGEND**

---	PROPERTY LINE
-12" W	EXISTING WATER LINE
-8" S	EXISTING SEWER DRAIN
- - -	EXISTING UTILITY EASEMENT
---	PROPOSED WATER LINE
---	PROPOSED SEWER LINE
- - -	PROPOSED UTILITY EASEMENT

Date	Description
10/16/20	Resubmittal



8280 E. GELDING DRIVE  
 Suite 101  
 Scottsdale, AZ 85260  
 United States  
 Tel 480.588.7226

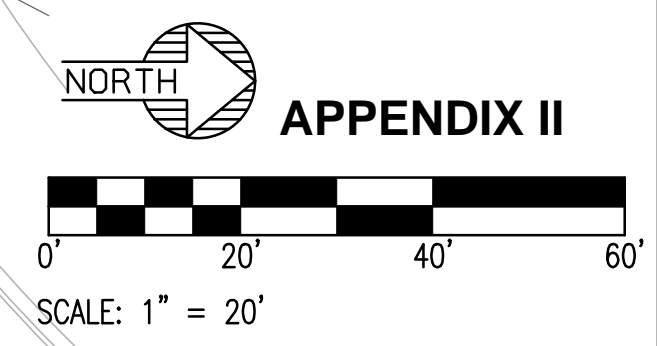
Seal / Signature

**NOT FOR CONSTRUCTION**

Project Name  
 3RD AVENUE+INDIAN SCHOOL ROAD - SCOTTSDALE, AZ  
 Project Number  
 200504 (SEG)  
 Description  
 PRELIMINARY UTILITY PLAN

Scale  
 As indicated

C4.00



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10-ZN-2020  
 10/22/20

APN 173-50-100A  
 SFC I OWNER LLC

APN 173-50-094  
 SFC I OWNER LLC

APN 173-50-119E  
 SFC I OWNER LLC



## 6" ONSITE SERVICE LINES – Allowable Capacity

### 6" Pipe at 1.0%, Full Flow

#### Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

#### Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Normal Depth	6.00	in
Diameter	6	in
Discharge	251.8	gal/min

#### Results

Discharge	251.8	gal/min
Normal Depth	6.00	in
Flow Area	0.20	ft²
Wetted Perimeter	1.57	ft
Hydraulic Radius	1.50	in
Top Width	0.00	ft
Critical Depth	0.38	ft
Percent Full	100.0	%
Critical Slope	0.01155	ft/ft
Velocity	2.86	ft/s
Velocity Head	0.13	ft
Specific Energy	0.63	ft
Froude Number	0.00	
Maximum Discharge	270.89	gal/min
Discharge Full	251.8	gal/min
Slope Full	0.01000	ft/ft
Flow Type	SubCritical	

## APPENDIX III – SEWER HYDRAULICS

## 8" Sewer along PEG West Property Line – Calculated Flow Hydraulics

<b>8" Sewer at 0.0152' - PEG West Lot Line</b>			
<b>Project Description</b>			
Friction Method	Manning Formula		
Solve For	Normal Depth		
<b>Input Data</b>			
Roughness Coefficient	0.013		
Channel Slope	0.01520	ft/ft	
Diameter	8	in	
Discharge	247.0	gal/min	
			Capacity at d/D = 0.65 is 506 gpm
<b>Results</b>			
Normal Depth	3.37	in	
Flow Area	0.14	ft <sup>2</sup>	
Wetted Perimeter	0.94	ft	
Hydraulic Radius	1.78	in	
Top Width	0.66	ft	
Critical Depth	0.35	ft	
Percent Full	42.1	%	
Critical Slope	0.00717	ft/ft	
Velocity	3.95	ft/s	
Velocity Head	0.24	ft	
Specific Energy	0.52	ft	
Froude Number	1.51		
Maximum Discharge	719.27	gal/min	
Discharge Full	668.6	gal/min	
Slope Full	0.00207	ft/ft	
Flow Type	SuperCritical		

### APPENDIX III – SEWER HYDRAULICS

## 8" Sewer along East PEG Property Line – Calculated Flow Hydraulics

<b>8" Sewer at 0.0152'/ - PEG East Lot Line</b>			
<b>Project Description</b>			
Friction Method	Manning Formula		
Solve For	Normal Depth		
<b>Input Data</b>			
Roughness Coefficient	0.013		
Channel Slope	0.01520	ft/ft	Capacity at d/D = 0.65 is 506 gpm
Diameter	8	in	
Discharge	253.9	gal/min	
<b>Results</b>			
Normal Depth	3.42	in	
Flow Area	0.14	ft²	
Wetted Perimeter	0.95	ft	
Hydraulic Radius	1.80	in	
Top Width	0.66	ft	
Critical Depth	0.35	ft	
Percent Full	42.7	%	
Critical Slope	0.00722	ft/ft	
Velocity	3.98	ft/s	
Velocity Head	0.25	ft	
Specific Energy	0.53	ft	
Froude Number	1.51		
Maximum Discharge	719.27	gal/min	
Discharge Full	668.6	gal/min	
Slope Full	0.00219	ft/ft	
Flow Type	SuperCritical		

## APPENDIX III – SEWER HYDRAULICS



## 8" PUBLIC SEWER AT PROPERTY LINES – Allowable Capacity

<b>8" Pipe at 0.0152 ft/ft; d/D=0.65</b>		
<b>Project Description</b>		
Friction Method	Manning Formula	
Solve For	Discharge	
<b>Input Data</b>		
Roughness Coefficient	0.013	
Channel Slope	0.01520	ft/ft
Normal Depth	5.20	in
Diameter	8	in
<b>Results</b>		
Discharge	505.8	gal/min
Flow Area	0.24	ft²
Wetted Perimeter	1.25	ft
Hydraulic Radius	2.31	in
Top Width	0.64	ft
Critical Depth	0.50	ft
Percent Full	65.0	%
Critical Slope	0.01029	ft/ft
Velocity	4.69	ft/s
Velocity Head	0.34	ft
Specific Energy	0.78	ft
Froude Number	1.35	
Maximum Discharge	719.27	gal/min
Discharge Full	668.6	gal/min
Slope Full	0.00870	ft/ft
Flow Type	SuperCritical	

## APPENDIX III – SEWER HYDRAULICS

## INDIAN SCHOOL ROAD LINE - Calculated Flow Hydraulics at Monitored Manhole #73 with PEG Scottsdale Pool

<b>10" Pipe at 0.0049' - Peak Flow w/ Pool</b>	
<b>Project Description</b>	
Friction Method	Manning Formula
Solve For	Normal Depth
<b>Input Data</b>	
Roughness Coefficient	0.013
Channel Slope	0.00490 ft/ft
Diameter	10 in
Discharge	683.7 gal/min
<b>Results</b>	
Normal Depth	8.14 in
Flow Area	0.48 ft <sup>2</sup>
Wetted Perimeter	1.87 ft
Hydraulic Radius	3.04 in
Top Width	0.65 ft
Critical Depth	0.55 ft
Percent Full	81.4 %
Critical Slope	0.00796 ft/ft
Velocity	3.21 ft/s
Velocity Head	0.16 ft
Specific Energy	0.84 ft
Froude Number	0.66
Maximum Discharge	740.45 gal/min
Discharge Full	688.3 gal/min
Slope Full	0.00483 ft/ft

## APPENDIX III – SEWER HYDRAULICS

## INDIAN SCHOOL ROAD LINE - Allowable Capacity at Manhole #73 with Pool Backwash

---

### 10" Pipe at 0.0049'/ d/D = 0.8

---

#### Project Description

Friction Method	Manning Formula
Solve For	Discharge

#### Input Data

Roughness Coefficient	0.013
Channel Slope	0.00490 ft/ft
Normal Depth	8.00 in
Diameter	10 in

#### Results

Discharge	672.8 gal/min
Flow Area	0.47 ft <sup>2</sup>
Wetted Perimeter	1.85 ft
Hydraulic Radius	3.04 in
Top Width	0.67 ft
Critical Depth	0.55 ft
Percent Full	80.0 %
Critical Slope	0.00789 ft/ft
Velocity	3.20 ft/s
Velocity Head	0.16 ft
Specific Energy	0.83 ft
Froude Number	0.67
Maximum Discharge	740.45 gal/min
Discharge Full	688.3 gal/min
Slope Full	0.00468 ft/ft
Flow Type	SubCritical

## APPENDIX III – SEWER HYDRAULICS

## INDIAN SCHOOL ROAD LINE - Calculated Flow Hydraulics at Monitored Manhole #73 without PEG Scottsdale Pool

### 10" Pipe at 0.0049'/' - Peak Flow w/o Pool

#### Project Description

Friction Method                      Manning Formula  
Solve For                                Normal Depth

#### Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00490	ft/ft
Diameter	10	in
Discharge	588.7	gal/min

#### Results

Normal Depth	7.11	in
Flow Area	0.41	ft²
Wetted Perimeter	1.67	ft
Hydraulic Radius	2.98	in
Top Width	0.76	ft
Critical Depth	0.51	ft
Percent Full	71.1	%
Critical Slope	0.00739	ft/ft
Velocity	3.16	ft/s
Velocity Head	0.16	ft
Specific Energy	0.75	ft
Froude Number	0.75	
Maximum Discharge	740.45	gal/min
Discharge Full	688.3	gal/min
Slope Full	0.00358	ft/ft
Flow Type	SubCritical	

## APPENDIX III – SEWER HYDRAULICS

## INDIAN SCHOOL ROAD LINE – Allowable Capacity at Monitored Manhole #73 without Pool Backwash

---

### 10" Pipe at 0.0049' d/D = 0.65

---

#### Project Description

Friction Method	Manning Formula
Solve For	Discharge

#### Input Data

Roughness Coefficient	0.013
Channel Slope	0.00490 ft/ft
Normal Depth	6.50 in
Diameter	10 in

#### Results

Discharge	520.7 gal/min
Flow Area	0.38 ft <sup>2</sup>
Wetted Perimeter	1.56 ft
Hydraulic Radius	2.88 in
Top Width	0.79 ft
Critical Depth	0.48 ft
Percent Full	65.0 %
Critical Slope	0.00705 ft/ft
Velocity	3.09 ft/s
Velocity Head	0.15 ft
Specific Energy	0.69 ft
Froude Number	0.79
Maximum Discharge	740.45 gal/min
Discharge Full	688.3 gal/min
Slope Full	0.00280 ft/ft
Flow Type	SubCritical

## APPENDIX III – SEWER HYDRAULICS

## 15" MILLER ROAD LINE – Allowable Calculated Capacity

<b>15" Pipe at 0.0204' d/D = 0.7</b>		
<b>Project Description</b>		
Friction Method	Manning Formula	
Solve For	Discharge	
<b>Input Data</b>		
Roughness Coefficient	0.013	
Channel Slope	0.02040	ft/ft
Normal Depth	10.50	in
Diameter	15	in
<b>Results</b>		
Discharge	3466.9	gal/min
Flow Area	0.92	ft²
Wetted Perimeter	2.48	ft
Hydraulic Radius	4.44	in
Top Width	1.15	ft
Critical Depth	1.10	ft
Percent Full	70.0	%
Critical Slope	0.01285	ft/ft
Velocity	8.42	ft/s
Velocity Head	1.10	ft
Specific Energy	1.98	ft
Froude Number	1.66	
Maximum Discharge	4454.37	gal/min
Discharge Full	4140.9	gal/min
Slope Full	0.01430	ft/ft
Flow Type	SuperCritical	

## APPENDIX III – SEWER HYDRAULICS

## 24" MILLER ROAD LINE - Allowable Calculated Capacity

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### 24" Pipe at 0.0085' d/D = 0.7

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#### Project Description

Friction Method	Manning Formula
Solve For	Discharge

#### Input Data

Roughness Coefficient	0.013
Channel Slope	0.00850 ft/ft
Normal Depth	16.80 in
Diameter	24 in

#### Results

Discharge	7837.1 gal/min
Flow Area	2.35 ft <sup>2</sup>
Wetted Perimeter	3.96 ft
Hydraulic Radius	7.11 in
Top Width	1.83 ft
Critical Depth	1.51 ft
Percent Full	70.0 %
Critical Slope	0.00710 ft/ft
Velocity	7.43 ft/s
Velocity Head	0.86 ft
Specific Energy	2.26 ft
Froude Number	1.16
Maximum Discharge	10069.34 gal/min
Discharge Full	9360.7 gal/min
Slope Full	0.00596 ft/ft
Flow Type	SuperCritical

## APPENDIX III – SEWER HYDRAULICS