

PRELIMINARY SEWER CAPACITY REPORT

(Including an Analysis of Stormwater Conservation)

for

PARK VILLAGE

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Scottsdale, AZ

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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 rsacks

DATE 9/5/2023

See comments on page ii



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1. Water Resources reserves the right to limit storm water discharge into the sanitary sewer should conditions warrant.
2. A maintenance agreement will be developed that defines the responsibility of the owner towards maintaining the pump station.
3. This discharge is subject to any federal, state and local regulations that address discharges to sanitary sewers.

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1. INTRODUCTION

1.1 SUMMARY OF PROPOSED DEVELOPMENT:

This project is a redevelopment of land occupied by the Cracker Jax Family Fun Amusement Park at the NEC of Scottsdale Road and East Tierra Buena Lane in Scottsdale, AZ. Proposed development is conceptualized to be a mixed use consisting of office/retail, hotel, condominium, multi-family residential, restaurant and open space/park uses. The community envisions innovative living incorporating sustainable technology positioning as a case study for future development in Scottsdale. Supplementing health lifestyles, healthy buildings, sustainable materials, and reusable resources is a water program designed to utilize the latest Energy Star certified appliances, protect and conserve onsite water use and site design incorporating low impact development standards.

As water conservation and reuse becomes more prevalent in the Southwest, Park Village is proposing an opportunity to supplement the city's Wastewater Reclamation facility with a controlled release of rainwater to the city's sanitary sewer system during off-peak sewer demand periods. At buildout, Park Village's domestic water use is estimated to be 435,000 gallons per day using demands in the city's Design Standards and Policies Manual (DS+PM). Of that 340,000 gpd is directed to the city's sewer system. Park Village's storm retention is estimated to be 1.6 million gallons during a 100-year, 2-hour rainfall event and 4.8 million gallons over the course of a typical year per NOAA data published for the Scottsdale Airpark. Stormwater will be retained in underground vaults and require pumping to the sewer system with drywells installed as an alternate/backup system.

The purpose of this report is twofold: evaluate both the onsite and offsite wastewater demands and their impact on Scottsdale's wastewater system and evaluate the existing wastewater system's available capacity to convey a controlled release of Park Village's retained stormwater from the site to the city's Southwest Pumpback Station. Extents of this study will be from the Park Village development south to the city's Southwest Pumpback Station located south and east of Doubletree Ranch Road and Scottsdale Road.

1.2 LEGAL DESCRIPTION:

The project property consists of two parcels of land located in a portion of Section 2, Township 3 North, Range 4 East of the Gila and Salt River Base and Meridian, Maricopa County, Arizona; Parcel ID numbers are APN: 215-44-002D and 215-44-002F. The property address is 16001 N. Scottsdale Road.

The site is bound by East Paradise Lane to the north, Dial Boulevard to the east, Tierra Buena Lane to the south and Scottsdale Road to the west. Refer to **FIGURE 1 - Vicinity Map** for the project's location with respect to major cross streets.

1.3 EXISTING AND PROPOSED SITE ZONING AND LAND USES:

Land ownership, as defined by the ALTA/NSPS Land Title Survey, prepared by Superior Surveying Services, Inc. includes 1,207,435 sq. ft. (27.72 acres) and is presently zoned C-4. The property is currently an amusement park consisting of one main building, an existing parking lot, a driving range and amusement attractions. The requested rezoning is to PCP.

1.4 AREA AND GENERAL PLAN REFERENCE:

The project is located in the Scottsdale Airpark area and falls within Mixed-Use Neighborhoods land use district of the city's General Plan.

2. DESIGN DOCUMENTATION

2.1 DESIGN COMPLIANCE:

Analysis of the sewer collection system will be done in compliance with Chapter 7 – Wastewater, of the City of Scottsdale 2018 Design Standards & Policies Manual (DS&PM). Design flow calculations for the on-site demands are based on the recommendations in Section 7-1.403.

Off-site flows along Dial Boulevard, Greenway-Hayden and Scottsdale Road were recently monitored over a nine-day period including two weekends by RDH Environmental Services at the following locations:

- Dial Boulevard north of Hayden Greenway (10" sewer)
- Greenway-Hayden east of Scottsdale Road (18" sewer)
- Scottsdale Road north of Thunderbird Road (18" sewer)
- Scottsdale Road at north of Berneil Drive (24" sewer)
- North of the Southwest Pump Station (42" DIP with a permanent city monitor)

The Scottsdale Water Department set an allowable depth of flow / pipe diameter (d/D) to 0.70 for purposes of evaluating the potential for conveyance of stormwater. 8" and 12" wastewater pipes will be evaluated at a d/D=0.65.

2.2 SOFTWARE ACKNOWLEDGEMENT:

Bentley FlowMaster® Version 8i (SELECTseries 1) was used for calculating hydraulic pipe capacities.

3. EXISTING CONDITIONS

3.1 EXISTING TOPOGRAPHY, VEGETATION AND LANDFORM FEATURES:

The northern site parcel has been maintained as a driving range. The southern parcel has been fully developed with the amusement park and parking lot. Topography slopes from the northeast to the southwest at approximately one percent with a change in elevation of approximately twenty (20) feet. Refer to **FIGURE 2** for an **Aerial** of the project's existing conditions.

FIRM Map Number 04013C1320L dated October 16, 2013, indicates this site is designated as **Zone "X" shaded**. As such, it is determined to be outside the 100-year flood hazard zone. Zone "X" shaded is defined as areas of 0.2-percent-annual-chance flood; areas of 1-percent-annual-chance-flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1-percent-annual-chance-flood. Refer to **FIGURE 5** for the **FIRM**.

3.2 EXISTING SEWER LINES:

Refer to **FIGURE 4** for the city's **Compiled Quarter Section Maps** from Park Village south to the Southwest Pumpback Station

- Paradise lane: an 8" VCP sanitary sewer is available approximately twelve (12) feet south of the centerline. Two manholes with a stub to the site are located 400' and 800' west of the intersection with North Dial Boulevard. The depth to invert is approximately 11'.
- North Dial Boulevard: a 10" VCP sanitary sewer is located approximately 5' west of the centerline. Three manholes show a stub to the site exist at approximately 330', 660', and 990' north of the intersection with East Tierra Buena Lane. Their respective depths are 9', 10' and 11'. This 10" VCP extends south to the Greenway-Hayden Loop connecting to an 18" sewer.
- East Tierra Buena Lane: an 8" VCP sanitary sewer exists approximately 13' south of the centerline. Two manholes with stubs to the site exist at 400' and 800' west of the intersection with North Dial Blvd. Their respective depths are 11' and 8'. The existing development connects to this sewer line approximately 450' west of the North Dial Boulevard intersection but the quarter-section map does not indicate that it is connected to a manhole. The service line size to the existing building is not shown.
- Greenway-Hayden Loop: an 18" VCP sewer between Dial Boulevard and Scottsdale Road.
- Scottsdale Road: there is no sewer line along North Scottsdale Road adjacent to the site's frontage. An 18" VCP sewer flows south along Scottsdale Road from the Greenway-Hayden Loop to Thunderbird/Redfield Road where it continues as a 24" VCP to Doubletree Ranch Road. At that intersection a 30" pipe provides a short run and increases to a 42" DIP leading to the Southwest Pump Station.

3.3 FLOW MONITORING RESULTS:

Manhole inverts were taken from the available information shown on the city's Quarter-Section Maps and overall pipe slopes calculated as shown on **FIGURE 4**. Flow monitoring was performed by RDH Environmental over a nine-day period between June 09, 2023 and June 19, 2023, generally located at the downstream reaches of a pipe prior to changing diameter or at locations where significant flow was added. The **Sewer Monitoring Summaries** are included in **APPENDIX II** along with a graphic representation of the flows.

4. PROPOSED ONSITE DEVELOPMENT

4.1 SITE PLAN:

The property is proposed to be re-developed with mixed uses consisting of 223 luxury hotel rooms, 100,000 sq. ft. of office space, 34,800 sq. ft. of restaurant/retail space, 241 condominiums and 995 multifamily residential units. Refer to **FIGURE 6** for a **Conceptual Site Plan** (this plan may indicate densities slightly differing from those shown in **Table 1** below).

4.2 PROPOSED SEWER SYSTEM:

For the purposes of this preliminary report, it is assumed that on-site sewers will consist of 8" and 12" pipes at a preliminary minimum slope of 0.52%. The offsite sewer improvements will consist of

a new 12" pipe in Tierra Buena and a new 18" pipe in Dial Boulevard from Monte Cristo Avenue to the Greenway Hayden Loop. Existing service laterals to the 10" VCP in Dial Boulevard will be reconnected allowing abandonment of the existing VCP. An oversizing agreement with the city may be requested.

APPENDIX I shows the wastewater basin areas contributing to the Greenway-Hayden Loop sewer. No sewer improvements are deemed necessary along either the Greenway-Hayden Loop or Scottsdale Road.

4.4 PHASING OF DEVELOPMENT:

APPENDIX VIII illustrates a potential **Phasing Plan** for construction. The sewer system can be constructed with two separate reaches. Phase 1 will connect to new 12" Tierra Buena Lane and require improvement of the offsite lines along Tierra Buena and Dial Boulevard for the proposed wastewater/stormwater conveyance. Phase 2 will construct the balance of onsite sewer improvements.

It is anticipated the proposed stormwater flow will be pumped to Dial Boulevard at approximately mid-site. Reference **APPENDIX VII** for a proposed site **Utility Exhibit**.

4.5 MAINTENANCE RESPONSIBILITIES:

The on-site and off-site sewer line improvements will be public and located within rights-of-way or easements dedicated to the City of Scottsdale. Therefore, the city will maintain the on-site and off-site sanitary sewers.

5. PROPOSED ON-SITE DOMESTIC SEWER DEMANDS

5.1 DEMAND TABLES:

The site sewer demand calculations were done in accordance with the DS&PM, Chapter 7 Section 7-1.403.B - Wastewater, Figure 7.1-2 Average Day Sewer Demand in gallons and the associated peaking factors.

5.2 VARIANCE FROM STATED DESIGN FLOWS:

No variance for on-site flow calculations is requested.

5.3 ONSITE DOMESTIC WASTEWATER CALCULATIONS

Table 1 provides a summary of the projected average daily and peak on-site domestic wastewater demands. A 225-gpm pool backwash allowance is based on an estimated seven pools averaging 50,000 gallons. No more than two pools will be backwashed simultaneously. Sand filters generally require 1.5 sq.ft. of medium per 10,000 gallons of water and generate 15 gpm/sq.ft. of medium. The estimated backwash rate is 112 gpm per pool.

Table 1: ON-SITE SEWER DEMAND CALCULATIONS

Block - Use	Square Feet	Dwelling Units	ADD (gpd/sq.ft.) (gpd/unit)	Avg. Day Demand (gpd)	Peaking Factor	Peak Demand (gpd)
A - Hotel		223	380.0	84,740	4.5	381,330
B - Condominium		126	140.0	17,640	4.5	79,380
C - Multi-Family		373	140.0	52,220	4.5	234,990
D - Restaurant	6,000		1.2	7,200	6.0	43,200
E - Restaurant	6,000		1.2	7,200	6.0	43,200
F - Restaurant	5,400		1.2	6,480	6.0	38,880
G - Open Space	87,120		0	0		0
H - Restaurant	5,400		1.2	6,480	6.0	38,880
J - Condominium		115	140.0	16,100	4.5	72,450
K - Restaurant	6,000		1.2	7,200	6.0	43,200
L - Restaurant	6,000		1.2	7,200	6.0	43,200
M - Multi-Family		312	140.0	43,680	4.5	196,560
N - Multi-Family		310	140.0	43,400	4.5	195,300
P - Office/Retail	100,000		0.4	40,000	3.0	120,000
Q - Parking Garage						
TOTALS						
	221,920	1,459		339,540		1,530,570
				TOTALS (gpm)	235.8	1,062.9

Pool Backwash allowance ~ 225 gpm

The peak demand including a pool backwash allowance is 1287.9 gpm.

6. ON-SITE STORMWATER RETENTION AND PROPOSED DISCHARGE

Referring to **APPENDIX IV**, the **Onsite Stormwater Retention** requirements for the 100-year rainfall are shown along with the NOAA average monthly rainfall used to determine a) the maximum probable discharge to the city's sewer system, and b) the estimated yearly rainfall which may be considered for a resource credit. The summaries are further described below.

6.1 ON-SITE 100—YEAR RAINFALL CALCULATIONS

A 100-year, 2-hour event (2.25 inches) generates an estimated volume of 224,258 cu.ft., or 1,677,450 gallons. As shown in **APPENDIX V**, the retained 100-year storm event is proposed to be pumped into the sanitary sewer system over two days during the lower monitored daily sanitary flow periods. Smaller rainfall events will also be retained and released at the same rate but require shorter durations. Onsite drywell recharge as an alternate method of stormwater dissipation will require the development of approximately twelve wells.

6.2 NOAA RAINFALL DATA FOR LOCAL AREA

The monthly and yearly climate data for the Scottsdale Municipal Airport taken from the NOAA data (ref. 3) as shown in the table below.

TABLE 2 – NOAA PRECIPITATION DATA FOR AIRPART AREA

Month	Drainage Area (acre)	Total Precipitation per month (in)	Total Precipitation per month (ft)	C Runoff	Total Provided Volume per month (Ac Ft.)	Total Provided Volume per month (Cubic Ft.)	Total Provided Volume per month (Gal)
Jan	27.72	0.13	0.011	0.90	0.27	11,773	88,068
Feb	27.72	0.44	0.037	0.90	0.91	39,847	298,075
March	27.72	0.19	0.016	0.90	0.40	17,207	128,714
April	27.72	0.00	0.000	0.90	0.00	0	0
May	27.72	0.00	0.000	0.90	0.00	0	0
June	27.72	0.18	0.015	0.90	0.37	16,301	121,940
July	27.72	0.84	0.070	0.90	1.75	76,071	569,053
Aug	27.72	3.78	0.315	0.90	7.86	342,321	2,560,739
Sept	27.72	0.00	0.000	0.90	0.00	0	0
Oct	27.72	0.70	0.058	0.90	1.46	63,393	474,211
Nov	27.72	0.31	0.026	0.90	0.64	28,074	210,008
Dec	27.72	0.60	0.050	0.90	1.25	54,337	406,467

The total volume of stormwater water available for reclamation is estimated to be 4,857,275 gallons per year (15 ac. ft.) with August having the higher rainfall volume and little rainfall during April, May and September.

6.3 SUMMARY OF PROPOSED STORMWATER RELEASE TO THE SANITARY SEWER

APPENDIX V graphically presents a plan to pump the 100-year retained rainfall over two 15-hour periods. The graph also indicates the maximum monitored flow rates and the pipe capacity at a d/D=0.7 at each of the monitored sites. The d/D pipe capacities all exceed the sum of Park Village’s peak flow (including pool backwash), the proposed stormwater pumping rate and the monitored maximum flow.

Onsite rainwater will be collected and stored in an underground vault located in the central park area. Filtering devices can be installed on inflow structures to minimize solids.

7. EXISTING OFF-SITE DOMESTIC SANITARY SEWER SYSTEM DEMANDS

7.1 Calculated Area Flowing to the 18” VCP at Scottsdale Road and Greenway-Hayden Loop:

Refer to **APPENDIX I** for the basin delineations. Park Village is 28+/- acres of a 152-acre sewer service area flowing to a 10” pipe in Dial Boulevard. The 18” sewer in Greenway-Hayden has a service area of 528 acres.

Table 3 shows the calculated flows to the respective sewer pipes within this area. Unit demands are based on gallons per day per acre taken from the city’s 2012 Water Reuse Master Plan.

TABLE 3 - EXISTING CALCULATED OFFSITE FLOWS TO 18" PIPE AT SCOTTSDALE RD. AND HAYDEN-GREENWAY LOOP

Basin	Area (AC)	Use	MP Avg Demand (gpad)	Average Daily Flow (gpm)	Cumulative Flow (gpm)	MP High Demand (gpad)	Peak Daily Flow (gpm)	Cumulative Flow (gpm)
10" Sewer in Dial Boulevard North of Tierra Buena								
1	62.7	Comm/Office	953	41.5		1574	68.5	
2	11.8	Comm/Office	953	7.8		1574	12.9	
3	16	Comm/Office	953	10.6		1574	17.5	
Areas 1, 2 and 3					59.9			98.9
8" Sewer in Tierra Buena East of Dial Blvd								
4	20.5	Comm/Office	953	13.6		1574	22.4	
Area 4					13.6			22.4
8" Sewer in Tierra Buena West of Dial Blvd								
5	6	Multi Family	1541	6.4		2060	8.6	
7	28.2	Mixed Use	1447	28.3		3000	58.8	
Areas 5 and 7					34.8			67.3
10" Sewer in Dial Boulevard South of Tierra Buena								
6	6.4	Multi Family	1541	6.8		2060	9.2	
9	1.6	Multi Family	1541	1.7		2060	2.3	
Areas 1, 2, 3, 4, 5, 6, 7 and 9					116.8			200.1
15" Sewer in Greenway-Hayden (east of Dial Blvd.								
8	382.6	Comm/Office	953	253.2		1574	418.2	
Area 8					253.2			418.2
18" Sewer in Greenway-Hayden (west of Dial Blvd.								
Areas 1 thru 9					478.2			807.0

Note: for reference the maximum monitored flow in Dial Boulevard 10" pipe was 130.4 gpm

Note: for reference the maximum monitored flow in Greenway-Hayden 18" pipe was 394.2 gpm

7.2 Proposed Development of Seventh Day Adventist Parcel:

Scottsdale has indicated this site northeast of Scottsdale Road and Sutton Drive is proposed to be developed and will generate additional flow into the 12" VCP in Thunderbird /Redfield that connects to the 18" sewer in Scottsdale Road. Calculations for this site prepared by Hunter Engineering show a proposed peak flow of 35.9 gpm. The Seventh Day Adventist flow will need to be added to the monitored results at locations 4 and 5 below. **APPENDIX V** indicates ample line capacity on both the 24" and 42" downstream pipes.

7.3 Monitored Flows (See Appendix II)

Location 1 – Greenway-Hayden Loop East of Scottsdale Road (18" VCP)

SEG COS MH1 Period Summary: Flow				
Measures	Value	Unit	Date	Time
Max.	394.19	gpm	Friday, June 16, 2023	2:00 PM
Min.	81.71	gpm	Sunday, June 11, 2023	5:25 AM
Avg.	209.26	gpm		
Total	3,022,727.57	gal		

Location 2 - Dial Boulevard North of Greenway-Hayden Loop (10" VCP - Note this pipe is proposed to be replaced with an 18" PVC).

SEG COS MH2 Period Summary: Flow				
Measures	Value	Unit	Date	Time
Max.	130.40	gpm	Monday, June 12, 2023	2:25 PM
Min.	5.19	gpm	Monday, June 19, 2023	1:10 AM
Avg.	70.65	gpm		
Total	1,023,875.52	gal		

Location 3 - N. Scottsdale Road, North of Thunderbird (18" VCP)

SEG COS MH3 Period Summary: Flow				
Measures	Value	Unit	Date	Time
Max.	416.01	gpm	Friday, June 16, 2023	2:05 PM
Min.	53.97	gpm	Friday, June 9, 2023	3:25 AM
Avg.	207.70	gpm		
Total	3,273,331.25	gal		

Location 4 - N. Scottsdale Road, North of Berneil Drive (24" VCP) Note: Flows at Locations 4 and 5 Do Not Account for Future Development of the Seventh Day Adventist Site

SEG COS MH4 Period Summary: Flow				
Measures	Value	Unit	Date	Time
Max.	1581.38	gpm	Tuesday, June 13, 2023	6:25 AM
Min.	357.57	gpm	Friday, June 9, 2023	5:25 AM
Avg.	793.81	gpm		
Total	12,502,585.91	gal		

Location 5 - Existing Scottsdale Monitor Located in Parking Lot Entrance of ROLFS Hair Salon (42" DIP)

SEG COS MH5 Period Summary: Flow				
Measures	Value	Unit	Date	Time
Max.	6735.64	gpm	Sunday, June 18, 2023	1:45 PM
Min.	2317.13	gpm	Wednesday, June 14, 2023	6:30 AM
Avg.	4472.90	gpm		
Total	73,266,162.95	gal		

8. PROPOSED SANITARY SEWER IMPROVEMENTS

8.1 Onsite Sanitary Sewer Improvements:

Onsite sewer piping will consist of 8" and 12" PVC SDR-35 pipe. Minimum slopes shall be preliminarily evaluated at 0.0052 ft/ft. Manholes will be standard precast with drops conforming to the DS+PM. Service pipes will be a minimum 6" diameter at 0.01 ft/ft. Onsite pipe capacities will be limited to a d/D of 0.65. All restaurants will provide individual passive grease interceptors.

An 8" PVC C-900 pipe is proposed between the retention vault pump and the 18" sewer in Dial Boulevard. A control valve will allow stormwater to be directed to the sewer or the drywells.

8.2 Offsite Sanitary Sewer Improvements:

Capacity of the existing 10" Dial Boulevard sewer will not be sufficient to serve this project so a new 18" sewer is proposed along Dial Boulevard from Monte Cristo Avenue south to Greenway-Hayden connecting to the existing 18" sewer and allowing for abandonment of the existing 10" sewer. This sewer will reconnect all existing service laterals to the 10" VCP.

The 8" sewer in Tierra Buena from the south drive entrance of Park Village east to Dial Boulevard will also be replaced with a new 12" sewer allowing abandonment of the existing 8" sewer.

No improvements are proposed to the Greenway-Hayden or Scottsdale Road sewer lines.

9. SANITARY SEWER HYDRAULIC CAPACITIES

9.1 Park Village Onsite Gravity Sewer Pipe Systems:

The onsite gravity pipes are designed to only convey Park Village's domestic wastewater. The proposed stormwater discharge will be conveyed to the offsite 18" pipe located at the intersection of Dial Boulevard and Monte Cristo Avenue via a pump system and 8" pressure pipe. Onsite pipe capacities are provided in **APPENDIX III** and summarized below. A minimum slope of 0.0052 ft/ft is assumed for the preliminary analysis.

TABLE 4 -PROPOSED ONSITE GRAVITY PIPES

Pipe Type	Pipe Size (in)	Slope (ft/ft)	d/D	Capacity (gpm)	Velocity (fps)	Maximum Capacity (gpm)
PVC (SDR-35)	8	0.0052	0.65	295.8	2.7	420.7
PVC (SDR-35)	12	0.0052	0.65	872.2	3.6	1240.4

9.2 Park Village Onsite Pressure Pipe System:

The retained onsite stormwater will be captured in an underground vault and pumped into the sanitary sewer system at a controlled rate designed for the 100-year rainfall. As stated earlier, the pumping period will be scheduled to occur during a period of lower flows in the downstream system.

TABLE 5 -PROPOSED ONSITE PRESSURE PIPE

Pipe Type	Pipe Size (in)	Duration (hours)*	Retention Pump El.	Inv.Out	Pipe Flow (gpm)	Velocity (fps)
PVC (C-900)	8	15	1482.0	1484.0	932	6.0

* duration for each day of a two-day period

The pump and retention vault will be owned and maintained by the property management association. As required, a drainage easement will be provided to the city over the retention vault and discharge facilities.

9.3 Dial Boulevard and Tierra Buena Gravity Pipe Improvements:

TABLE 6 -PROPOSED OFFSITE GRAVITY PIPES

Pipe Location	Pipe Size (in)	Slope (ft/ft)	d/D	Capacity (gpm)	Velocity (fps)	Maximum Capacity (gpm)
Tierra Buena (West of Dial Blvd.)	12	0.0046	0.65	820.3	3.4	1166
Dial Blvd (North of Greenway-Hayden)	18	0.0050	0.7	2791	4.7	3586

9.4 Offsite Combined Wastewater/Storm Gravity Pipe Systems:

Proposed offsite improvements include a new 12" pipe along Tiera Buena Lane from the south drive entrance to Dial Boulevard and a new 18" pipe along Dial Boulevard from the east drive entrance to Greenway-Hayden Loop. The existing sewers will be abandoned and any existing service laterals reconnected to the new pipes.

Following are the calculated d/D and full flow capacities for the offsite pipes at the monitored locations.

TABLE 7 - EXISTING PIPE CAPACITIES AT MONITORED MANHOLES

Monitored Manhole	Location	Pipe	d/D	Mannings n-Value	Min. Pipe Slope (ft/ft)	d/D Capacity (gpm)	Velocity (fps)	Full Flow Capacity (gpm)
2 (note1)	Dial Boulevard North of Greenway-Hayden	18" PVC	0.7	0.013	0.0050	2,791	4.7	3,586
1	Greenway-Hayden east of Scottsdale Rd.	18" VCP	0.7	0.013	0.0046	2,677	4.5	3,440
3	Scottsdale Road at Thunderbird	18" VCP	0.7	0.013	0.0075	3,418	5.8	4,392
4	Scottsdale Road North of Berneil	24" VCP	0.7	0.013	0.0050	6,011	5.7	7,723
5	North of SW Pump Station	42" VCP	0.7	0.013	0.0014	14,145	4.4	18,174

Note 1 - Monitored pipe was 10" - Data shown in Table is for the proposed 18" Pipe

The following table accounts for the existing maximum monitored flows and proposed flow from Park Village. The 24" and 42" pipes show adequate capacity for future additional flow.

TABLE 8 - PROPOSED FLOW INCLUDING STORMWATER IN PIPES UPSTREAM OF MONITORED MANHOLES

Monitored Manhole	Location	Pipe	d/D	Max. Flow in 10-hr Period (gpm) (note 2)	Park Village Peak Flow + Backwash (gpm)	Park Village 100-Year Storm -Released during two 15 hour periods (gpm)	Total Flow (gpm)	Pipe Capacity @ d/D = 0.7 (gpm)
2 (note 1)	Dial Boulevard North of Greenway-Hayden	18" PVC	0.7	100	1,288	932	2,320	2,791
1	Greenway-Hayden east of Scottsdale Rd.	18" VCP	0.7	300	1,288	932	2,520	2,677
3	Scottsdale Road at Thunderbird	18" VCP	0.7	300	1,288	932	2,520	3,418
4	Scottsdale Road North of Berneil	24" VCP	0.7	1,600	1,288	932	3,820	6,011
5	North of SW Pump Station	42" VCP	0.7	5,400	1,288	932	7,620	14,145

Note 1 - Monitored pipe was 10" - Data shown in Table is for the proposed 18" Pipe

Note 2 - refer to FIGURE 3 for maximum monitored flow during the designated 15-hour period.

10. ANALYSIS OF EXISTING/PROPOSED PIPE CAPACITIES

Adequate sewer capacity is demonstrated to convey the peak flow from Park Village along with the proposed pumping of stormwater with the proposed improvement of an 18" pipe along Dial Boulevard and a 12" pipe along Tierra Buena contributing to the existing city sewer infrastructure.

The 8" and 12" onsite pipes at a preliminary minimal slope of 0.0052 ft/ft are adequate to convey wastewater from the development.

11. WASTEWATER MANAGEMENT PRINCIPLES

Refer to **APPENDIX IX** for a memo outlining potential wastewater management and efficiency concepts that Park Village intends to pursue.

12. SUMMARY

12.1 SUMMARY OF PROPOSED IMPROVEMENTS:

- The proposed wastewater improvements are designed based on the current City of Scottsdale's design standards and policies.
- Park Village proposes to construct a new 18" sewer main from the project south to Greenway-Hayden along Dial Blvd. supporting the development and providing additional capacity for future development.
- The on-site systems consisting of 8", 10" and 12" pipes are designed compliant to the DS+PM.

12.2 PROJECT SCHEDULE:

As a mixed-use development, the infrastructure is proposed to be constructed in a single phase. The developer may propose to construct the onsite sewer system to Dial Boulevard separately from the onsite system to Tierra Buena Avenue. The onsite stormwater force main and 18" sewer improvements in Dial Boulevard will be constructed in Phase 1. A conceptual **Phasing Plan** is included as **APPENDIX VIII**.

13. SUPPORTING MAPS

13.1 CONCEPTUAL SITE PLAN

Refer to **FIGURE 6** for a Conceptual Site Plan.

13.2 PRELIMINARY UTILITY PLAN

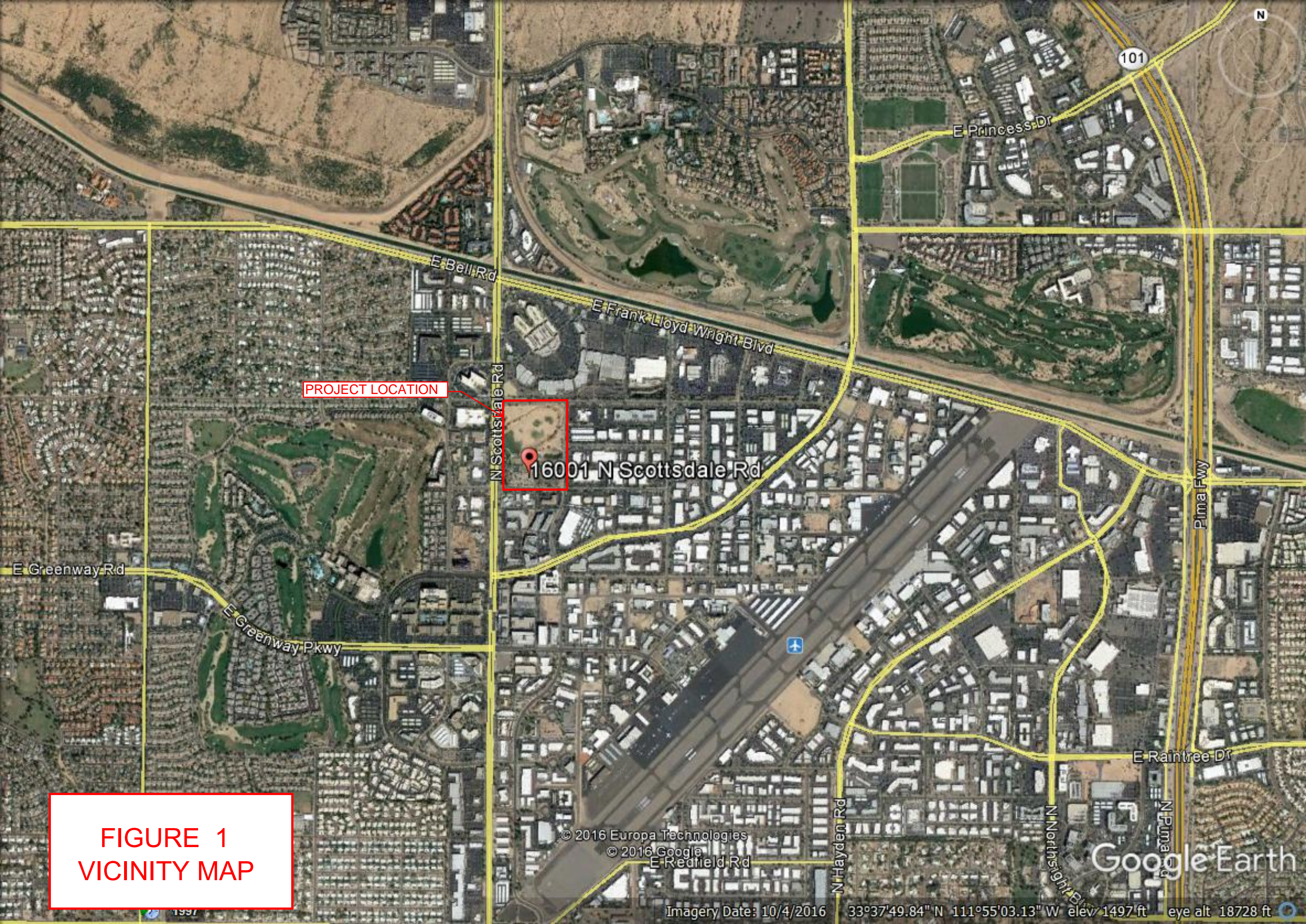
Refer to **APPENDIX VII** for a Site Utility Plan

14. REFERENCES

1. COS Q-S Sewer Plans
2. City of Scottsdale Design Standards & Policies Manual, 2018 (Chapter 7 – Wastewater)
3. NOAA Climate Data Online – Scottsdale Municipal Airport, 2022

FIGURES:

- 1 - Vicinity map*
- 2 - Aerial*
- 3 - Scottsdale Pumpback System*
- 4 - Compiled Q-S Maps*
- 5- FIRM*
- 6- Conceptual Site Plan*



PROJECT LOCATION



16001 N Scottsdale Rd

**FIGURE 1
VICINITY MAP**

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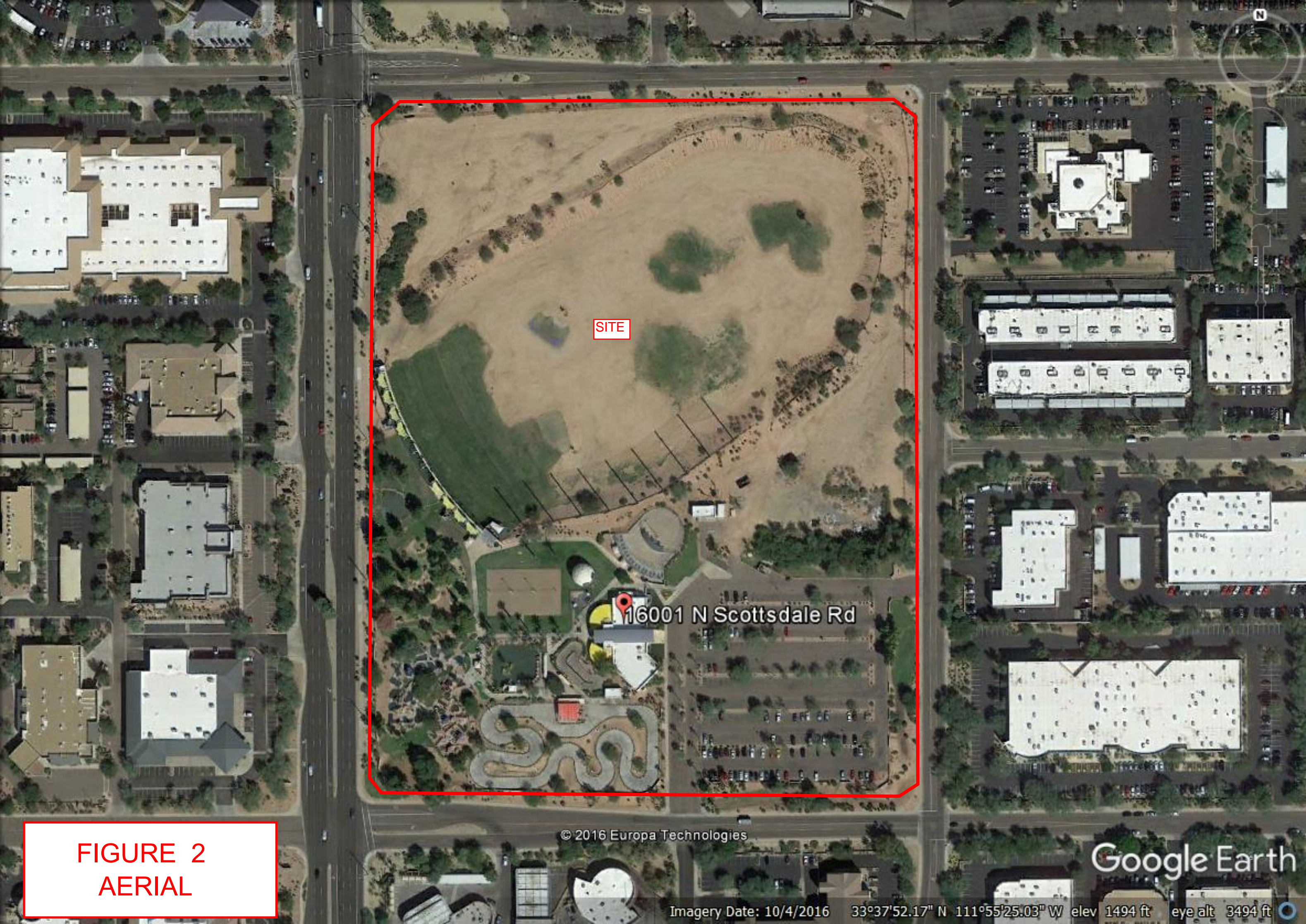
© 2016 Google

E Redfield Rd

Google Earth

Imagery Date: 10/4/2016

33°37'49.84" N 111°55'03.13" W elev 1497 ft eye alt 18728 ft



SITE

16001 N Scottsdale Rd

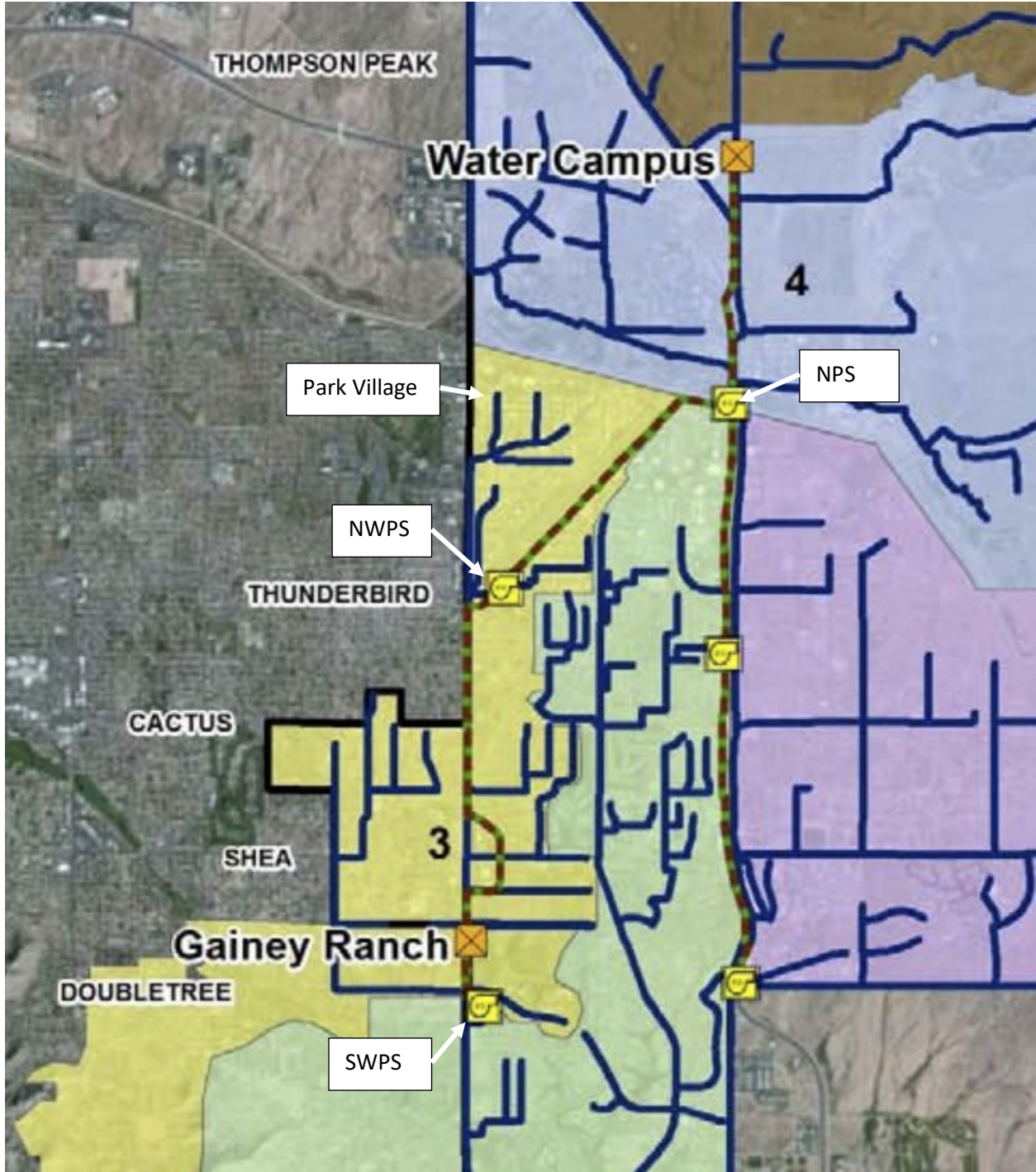
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Google Earth

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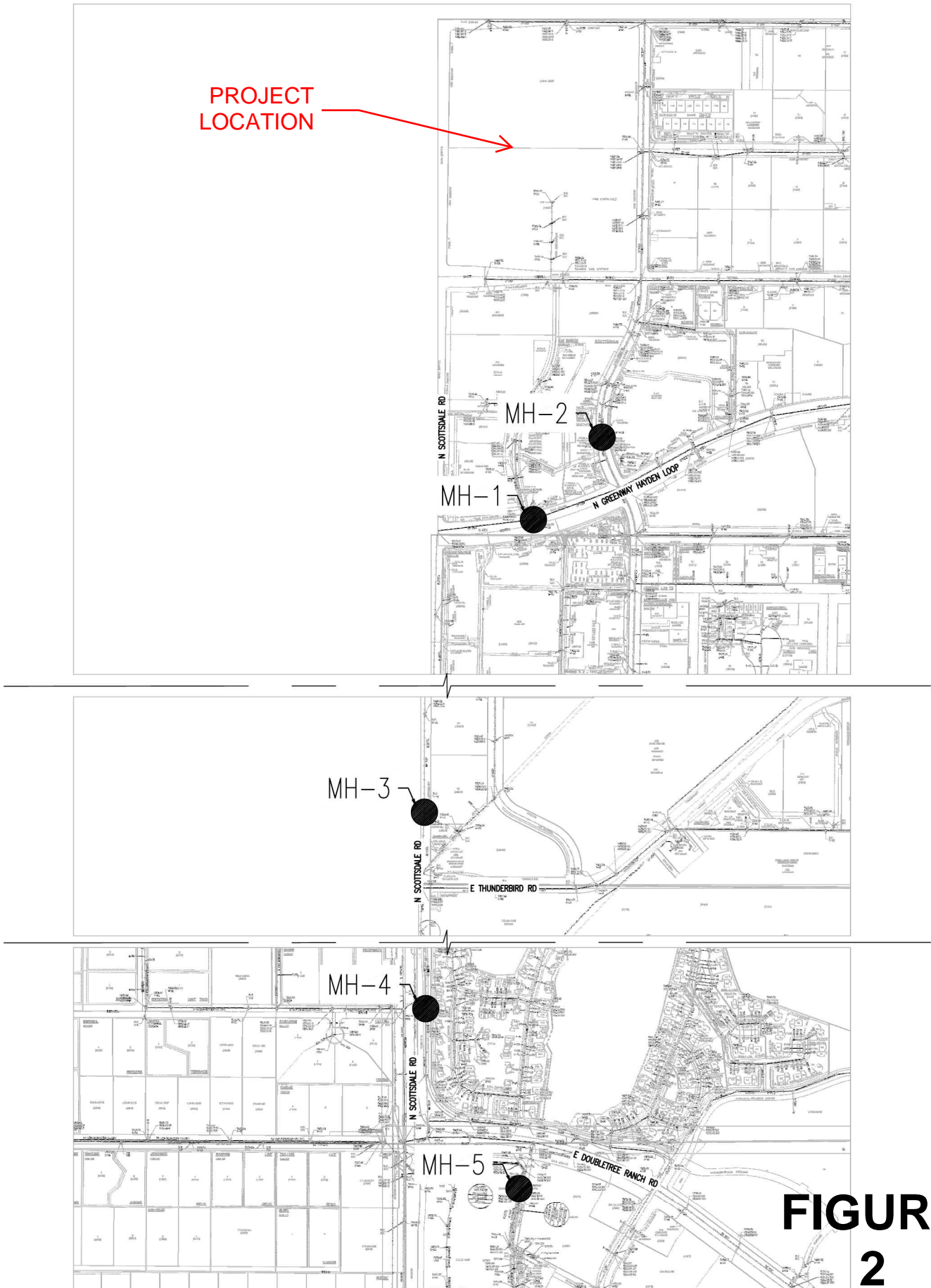
FIGURE 2
AERIAL

SCOTTSDALE SEWER COLLECTION AND PUMPBACK SYSTEM

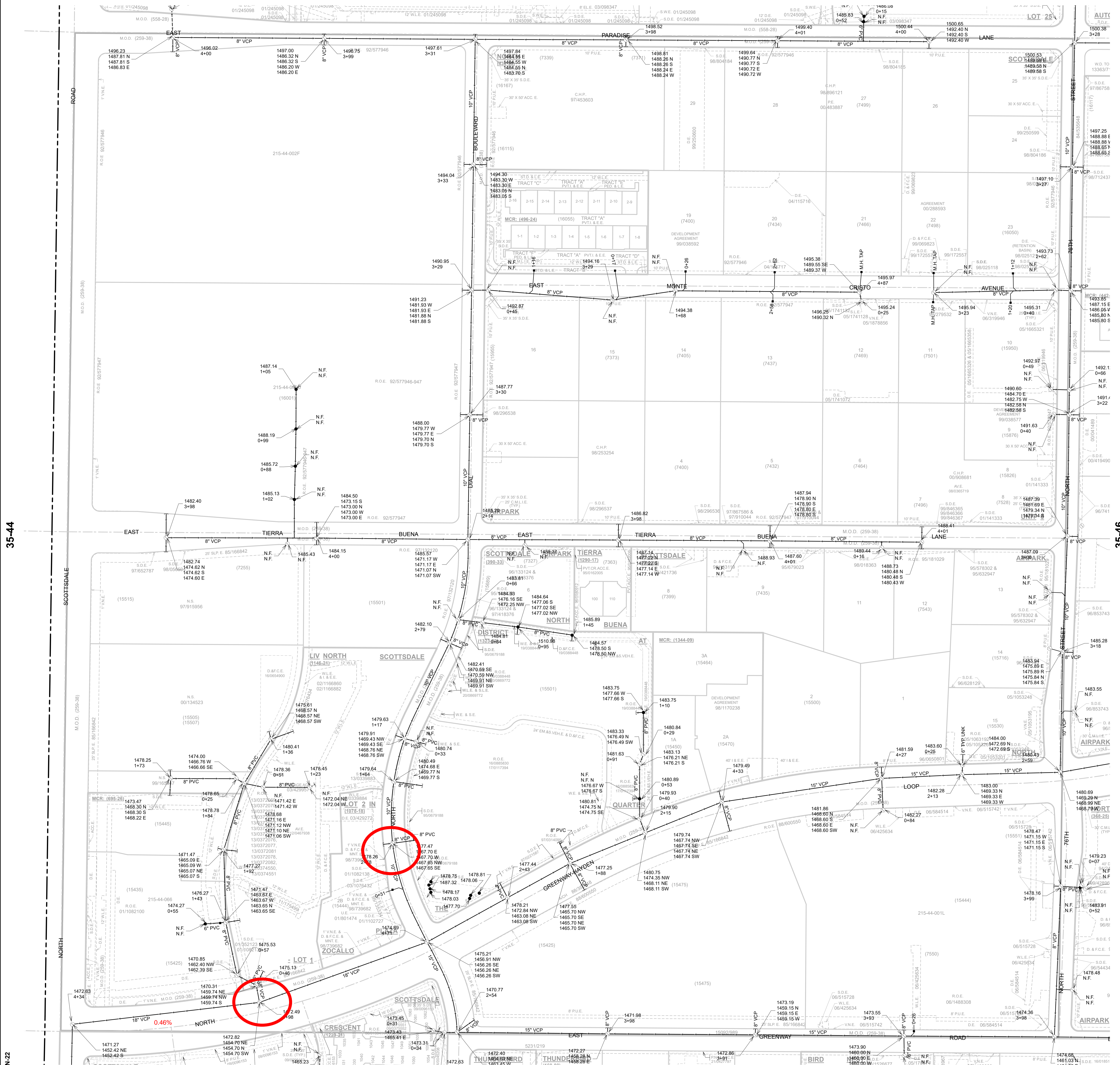


Nelsen Partners > Park Village - Scottsdale - NEC Scottsdale Rd & Tierra Buena Lane - 211005 > 2 CIVIL (SEG) > 2.3 Reports > 2.3.5 Sustainability

FIGURE 3 –
Scottsdale Pumpback System Area



**FIGURE
2**

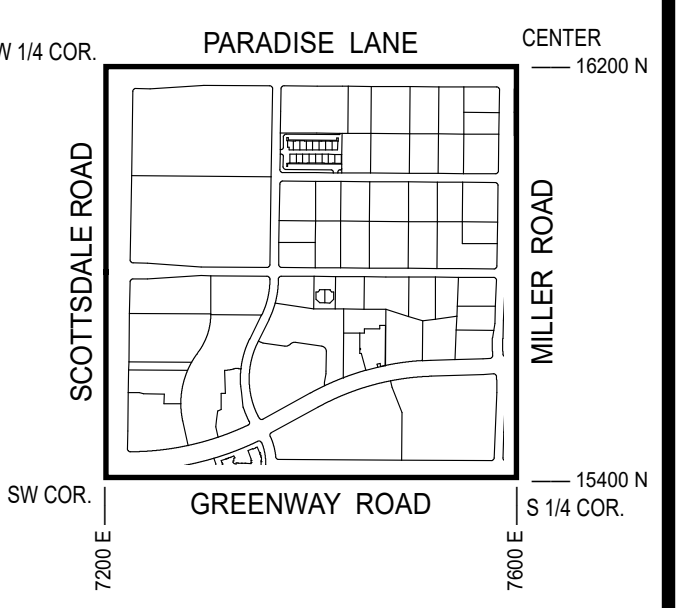


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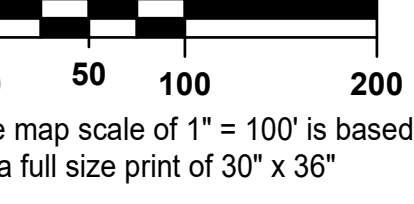
- Cleanout
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- Plug
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- Sewer Tap Point
- Sewer Valve
- Treatment Plant
- Sewer Main - Gravity
- Sewer Main - Force
- Sewer Main - Private

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

35-45

SW 1/4 SEC. 2 T3N R4E

FIGURE 2

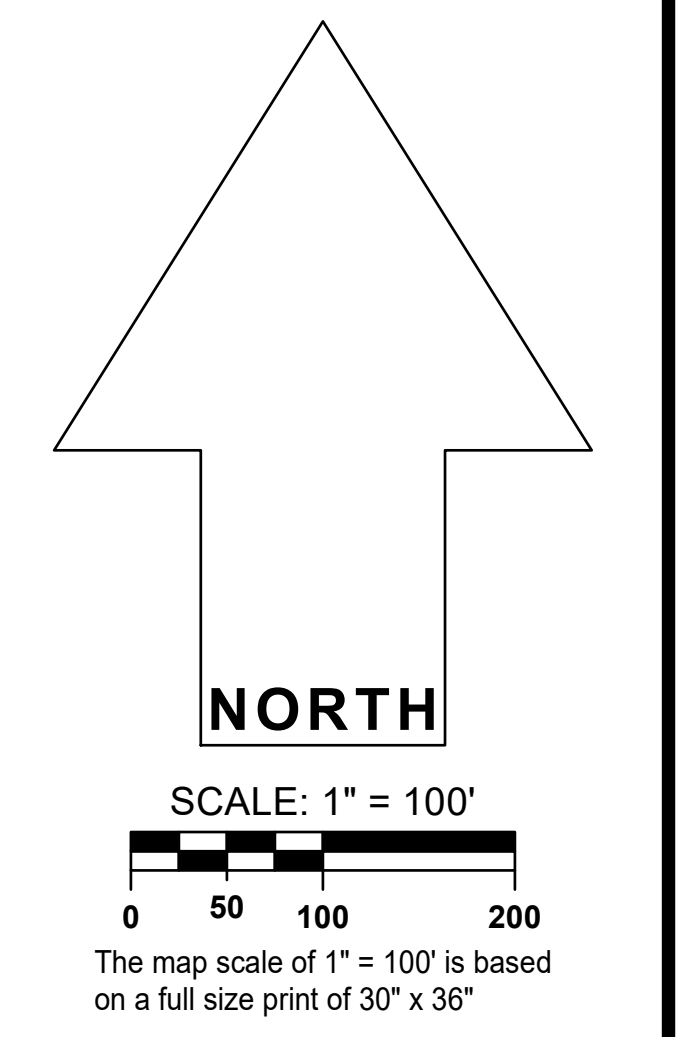
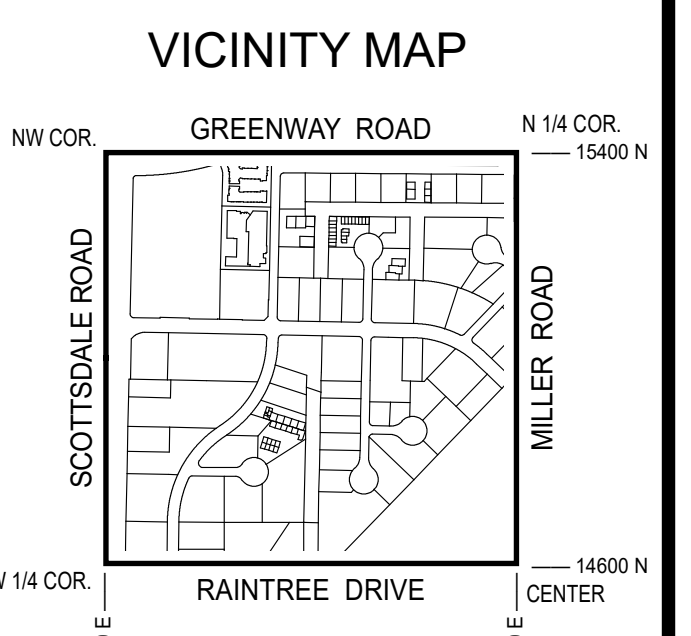
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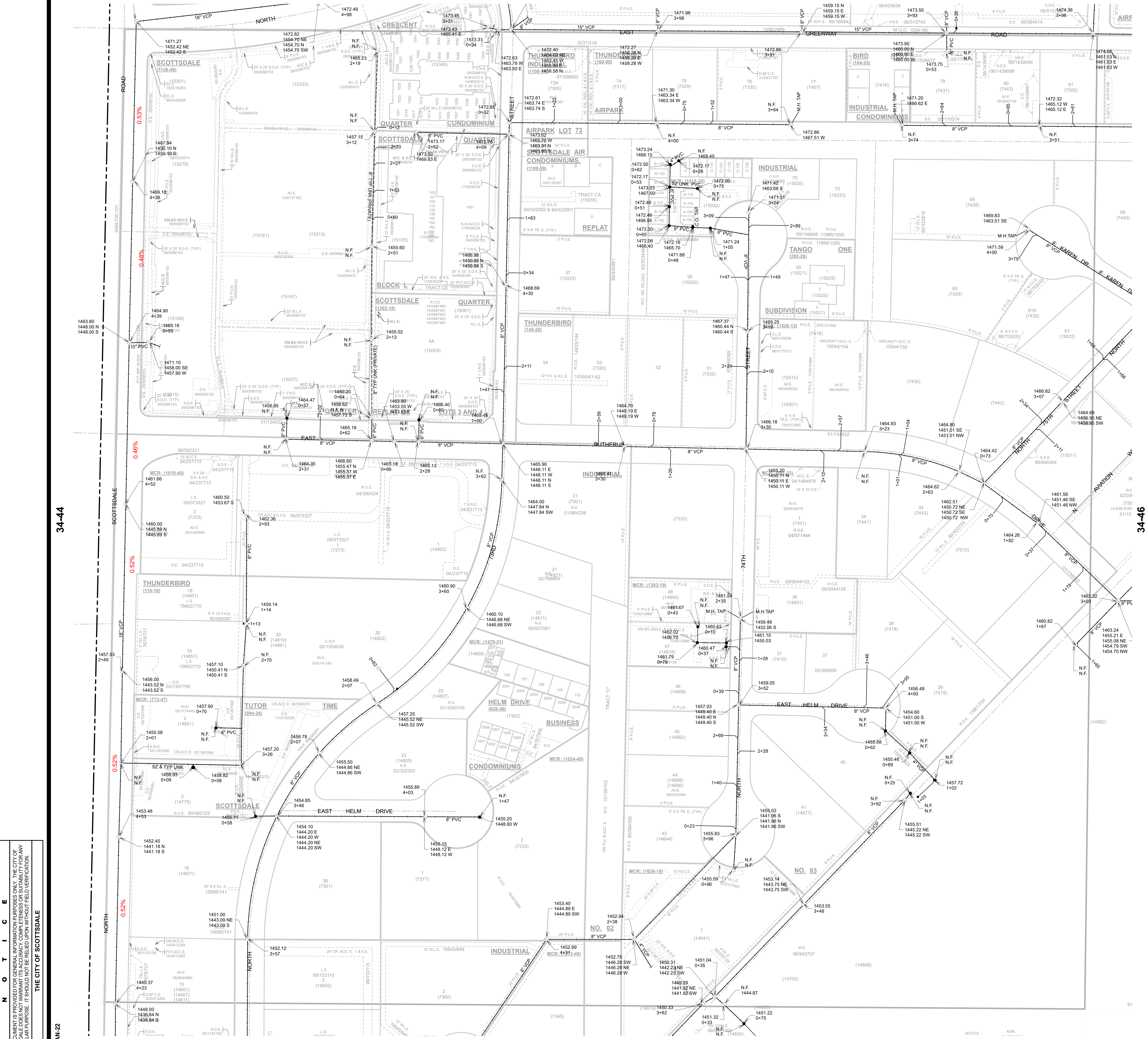
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SEWER
 QUARTER SECTION MAP
34-45
 NW 1/4 SEC. 11 T3N R4E















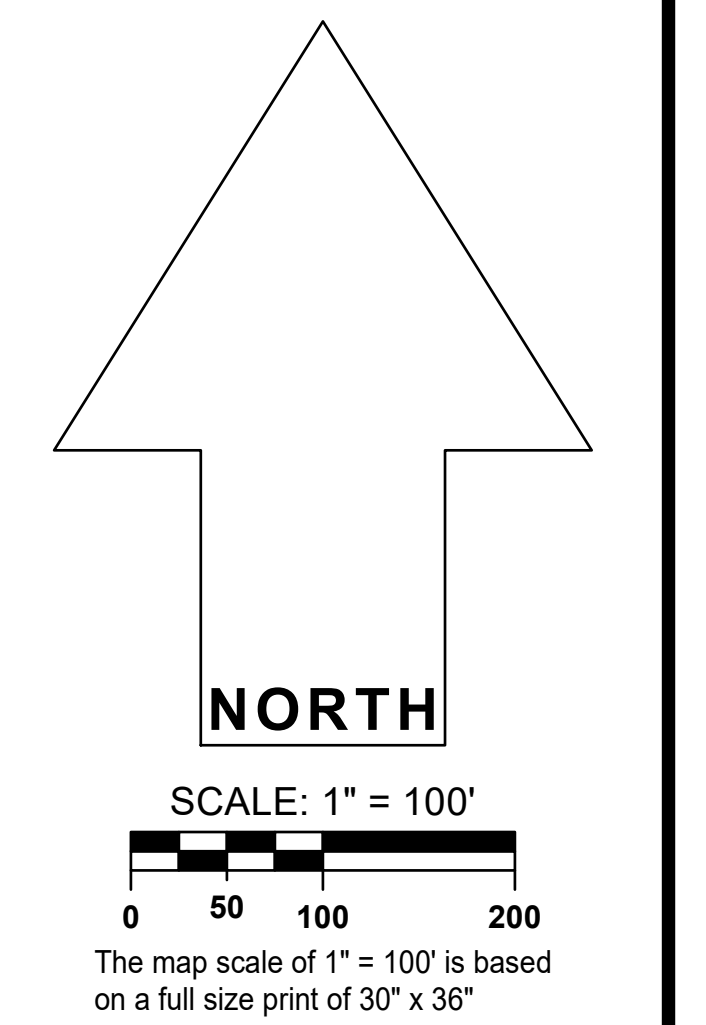
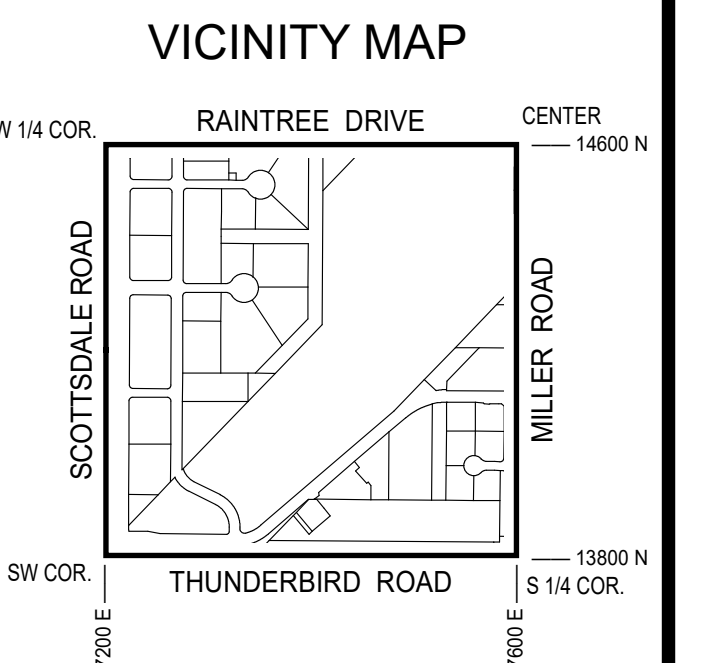
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SEWER QUARTER SECTION MAP

33-45

SW 1/4 SEC. 11 T3N R4E

NOTICE

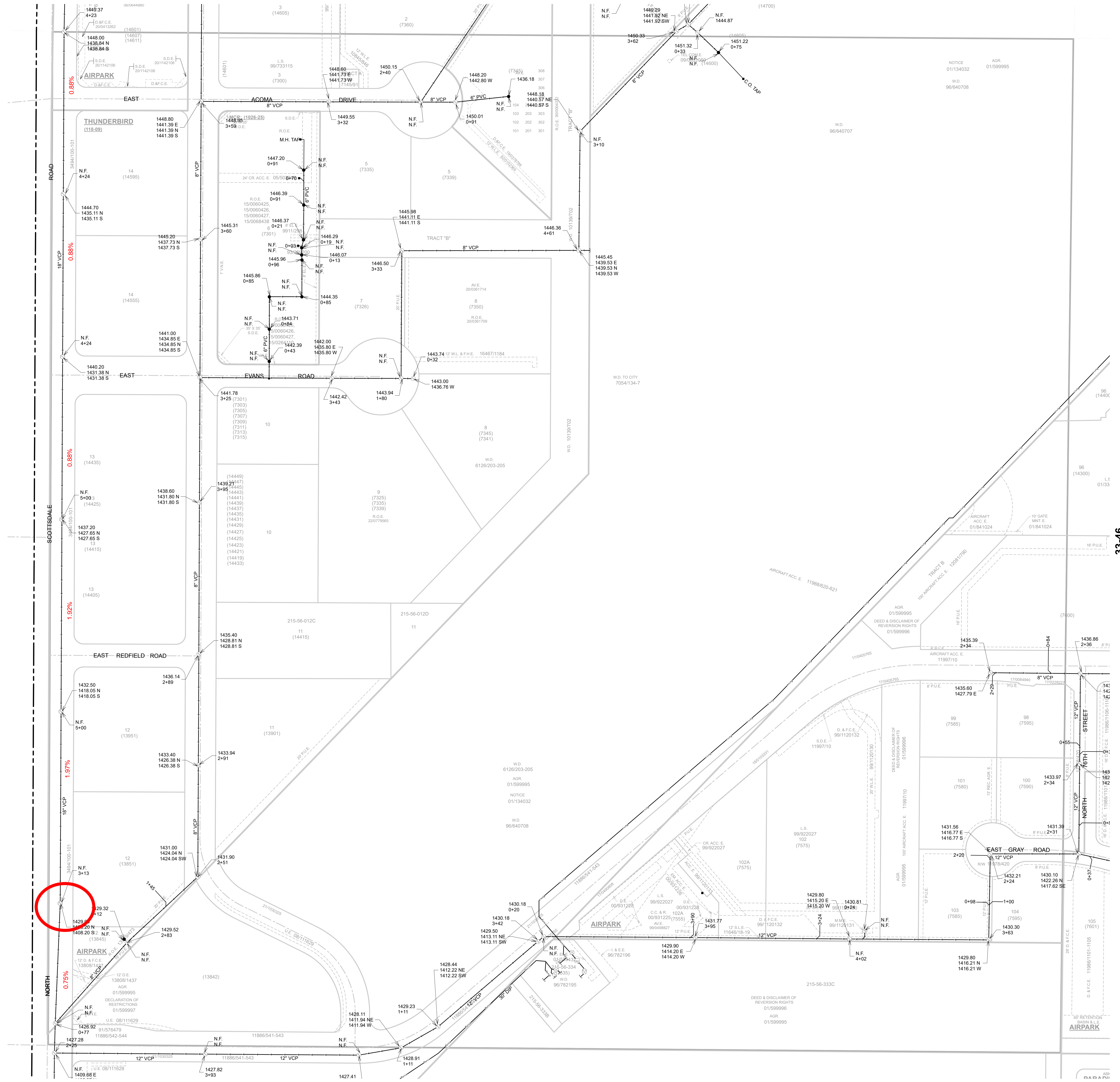
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33-44

33-46










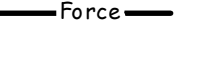


19-MAR-23



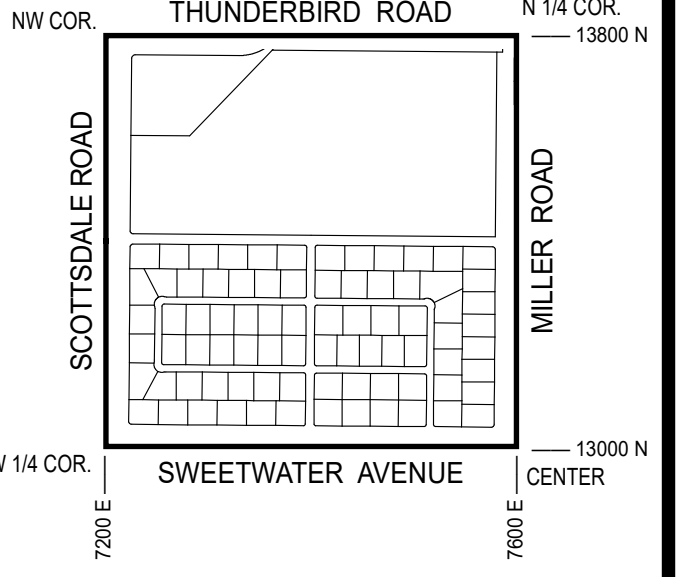
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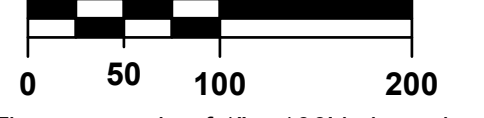
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VICINITY MAP



NORTH

SCALE: 1" = 100'



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SEWER
QUARTER SECTION MAP

32-45

NW 1/4 SEC. 14 T3N R4E

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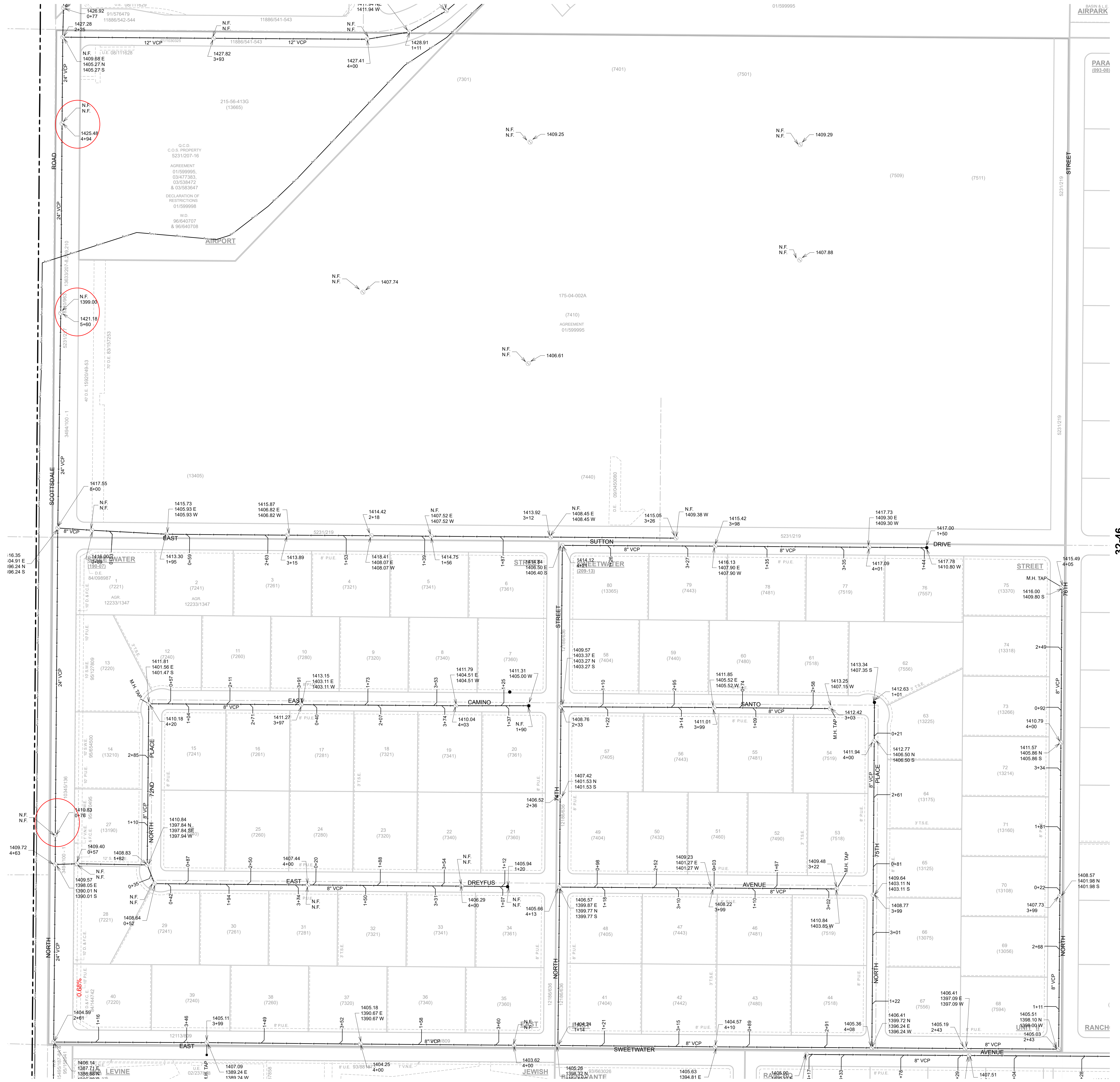
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32-44

32-46

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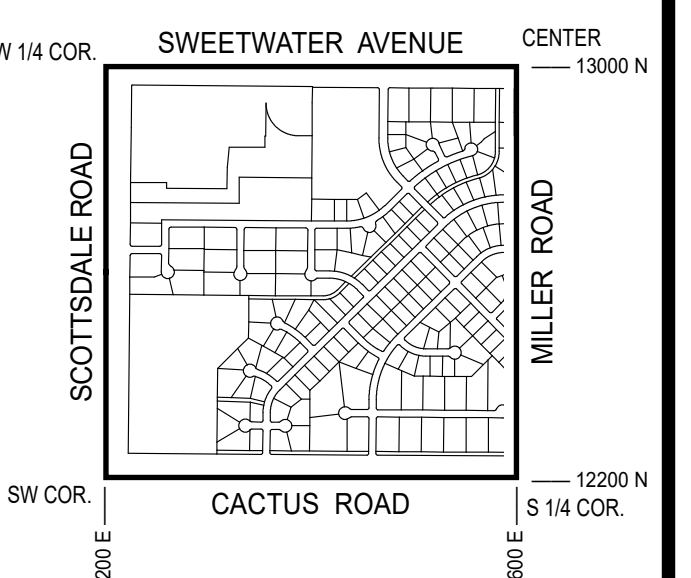
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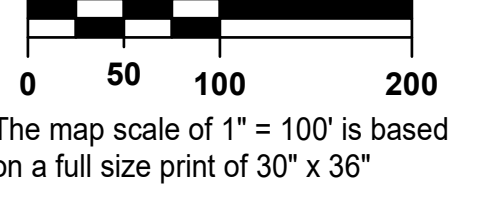
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VICINITY MAP



NORTH

SCALE: 1" = 100'



SEWER QUARTER SECTION MAP

31-45

SW 1/4 SEC. 14 T3N R4E

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31-44

31-46

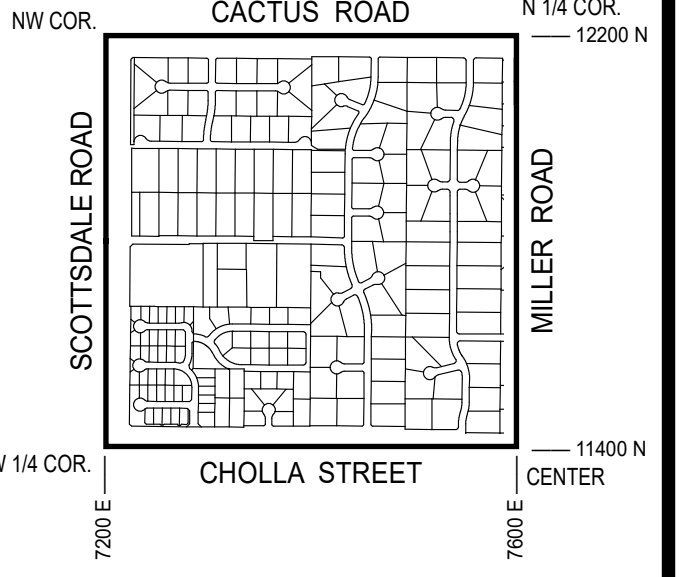
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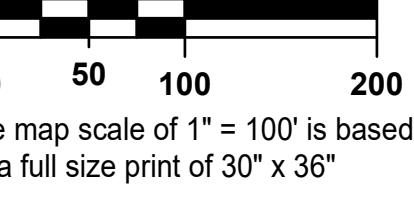
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VICINITY MAP



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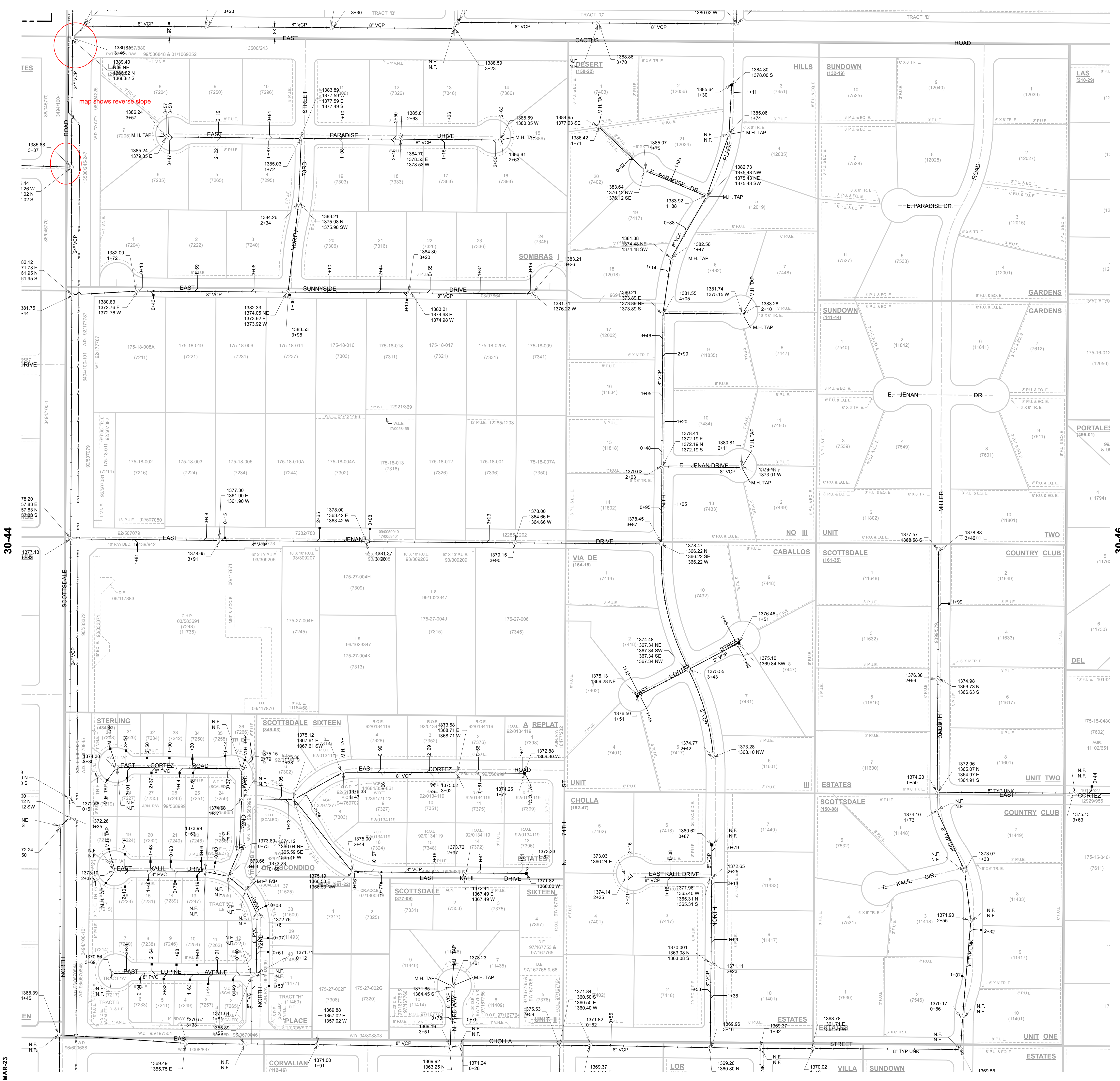
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SEWER QUARTER SECTION MAP

30-45

NW 1/4 SEC. 23 T3N R4E

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map shows reverse slope

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









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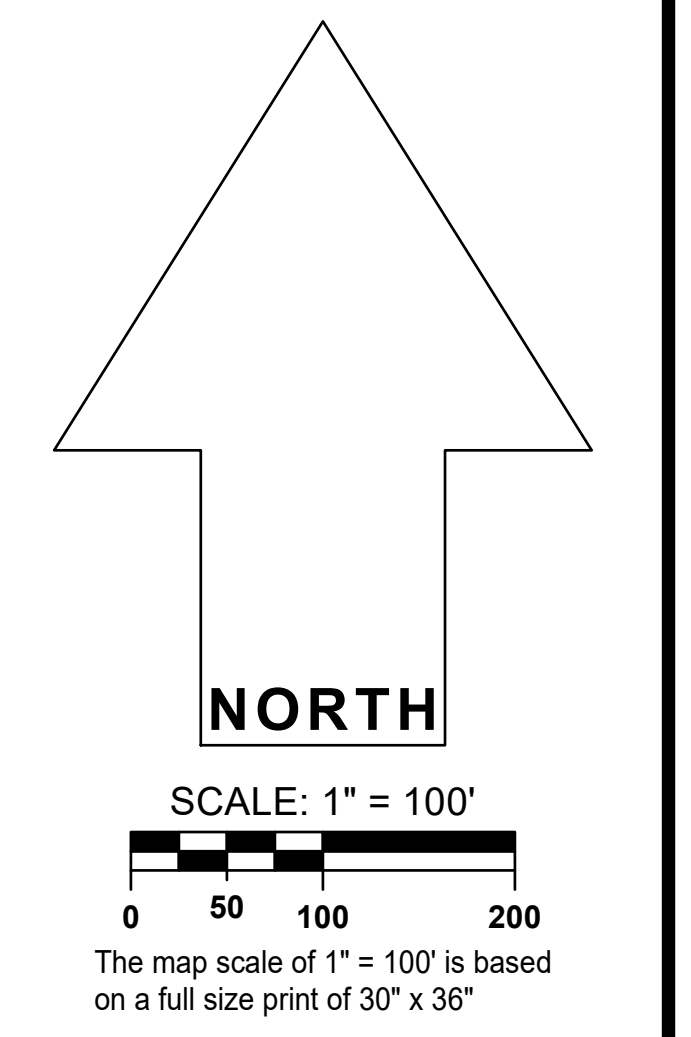
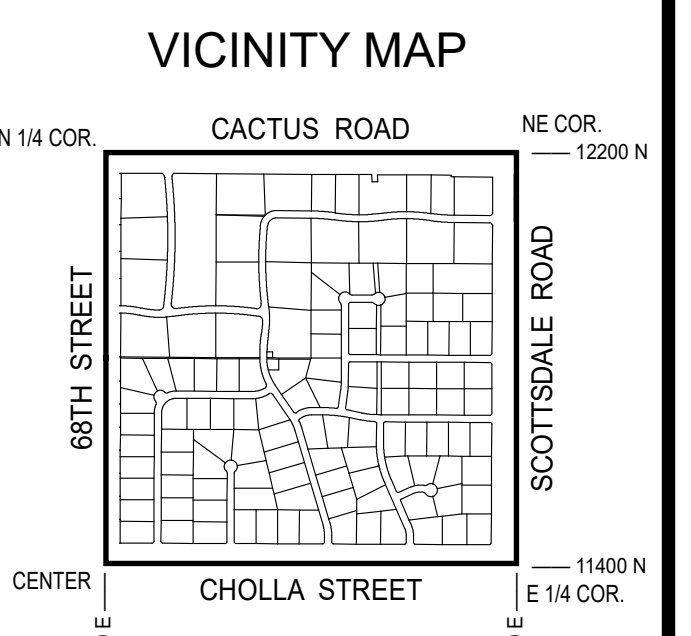
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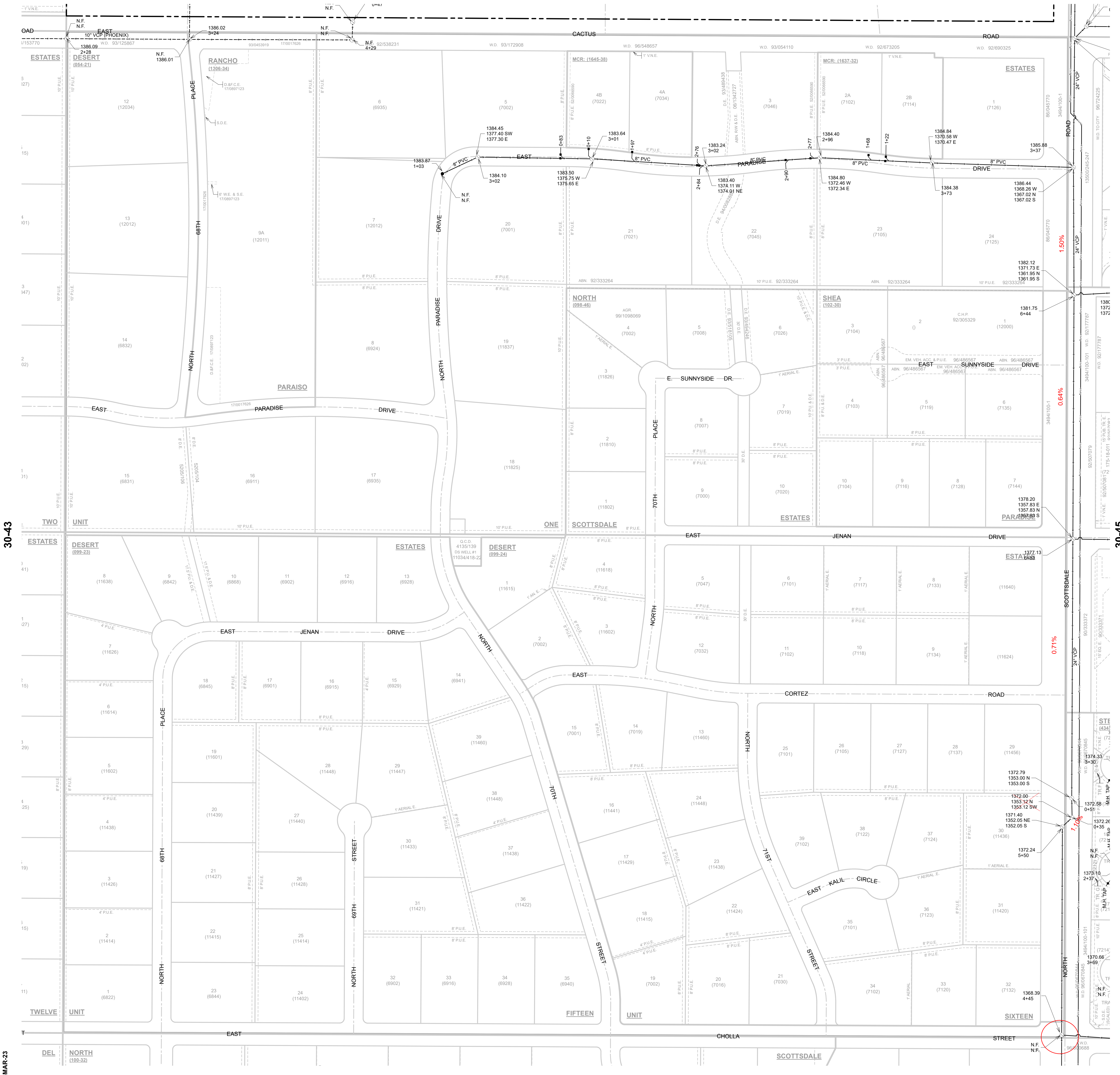
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SEWER
QUARTER SECTION MAP
30-44
 NE 1/4 SEC. 22 T3N R4E

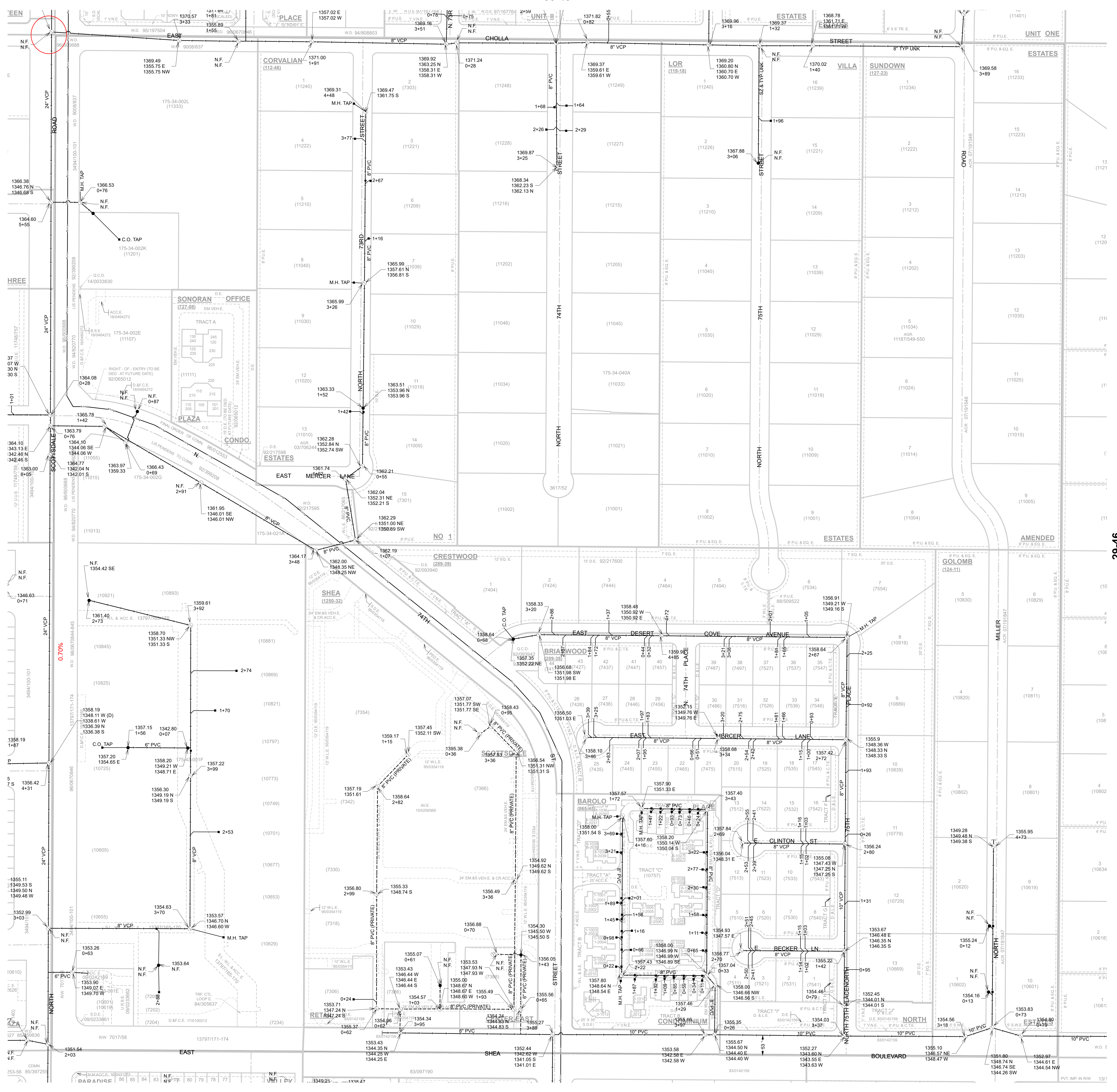
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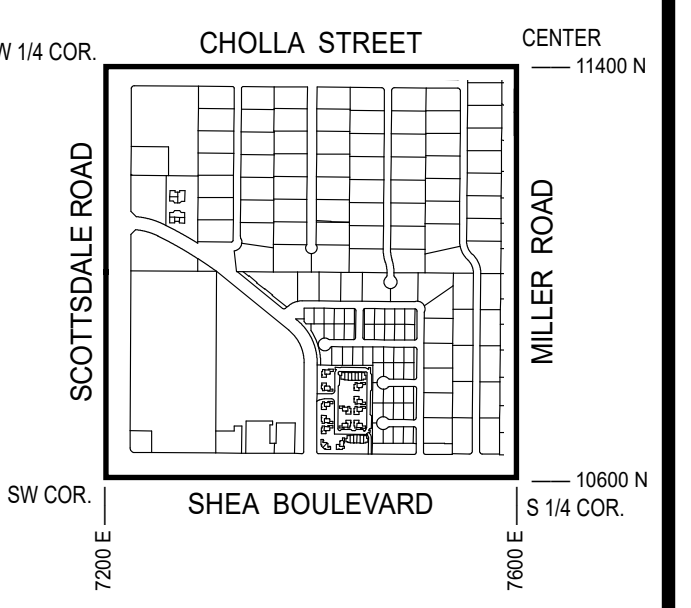


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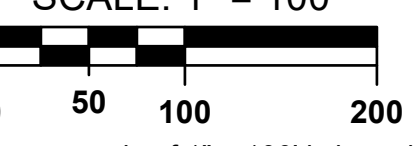
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VICINITY MAP



NORTH

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SEWER QUARTER SECTION MAP

29-45

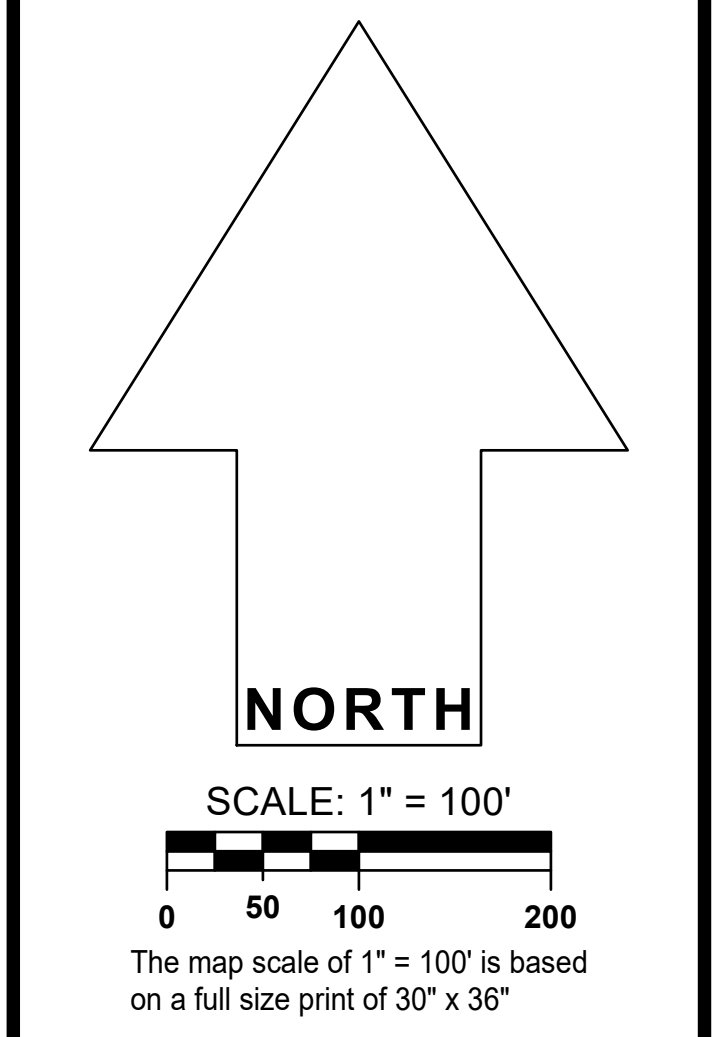
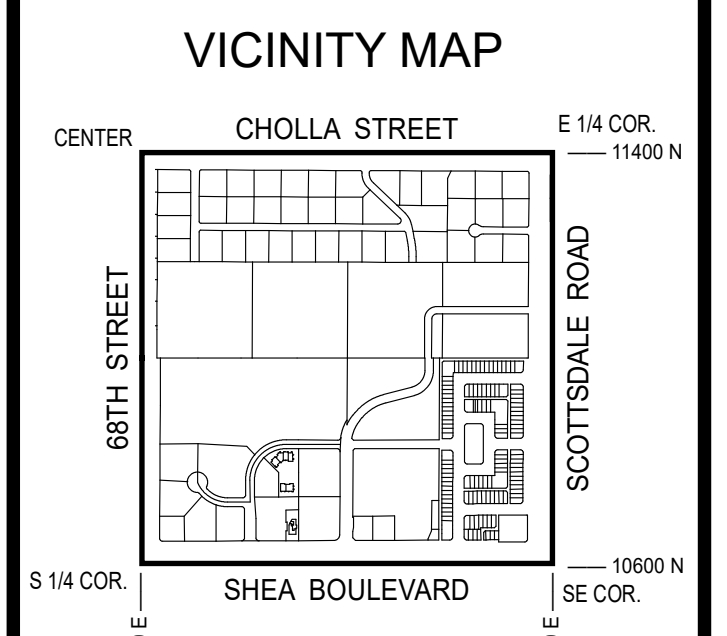
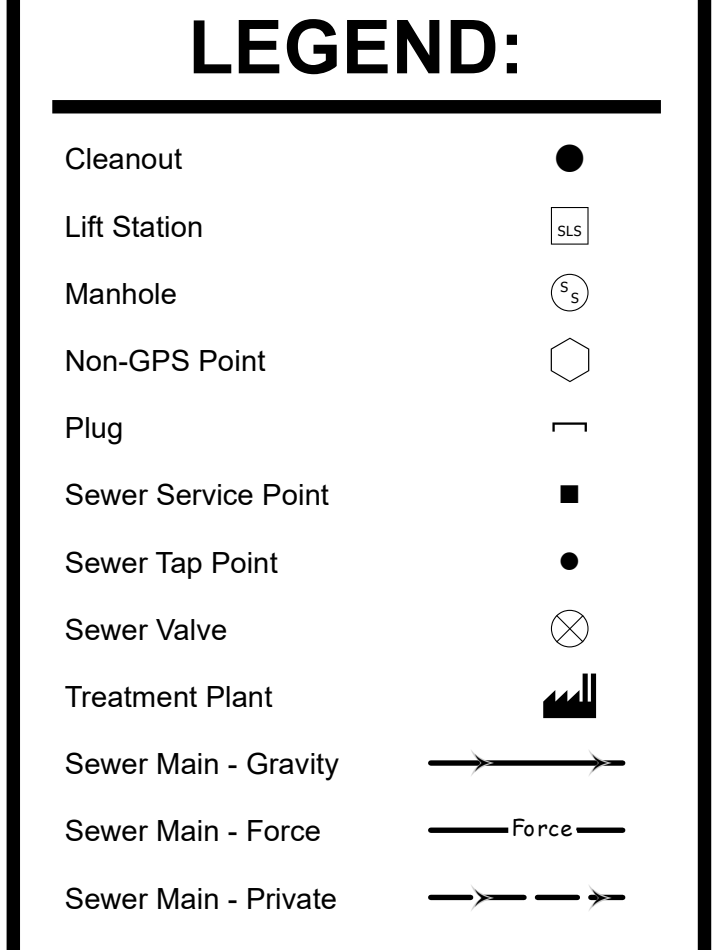
SW 1/4 SEC. 23 T3N R4E

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



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SEWER
 QUARTER SECTION MAP
29-44
 SE 1/4 SEC. 22 T3N R4E

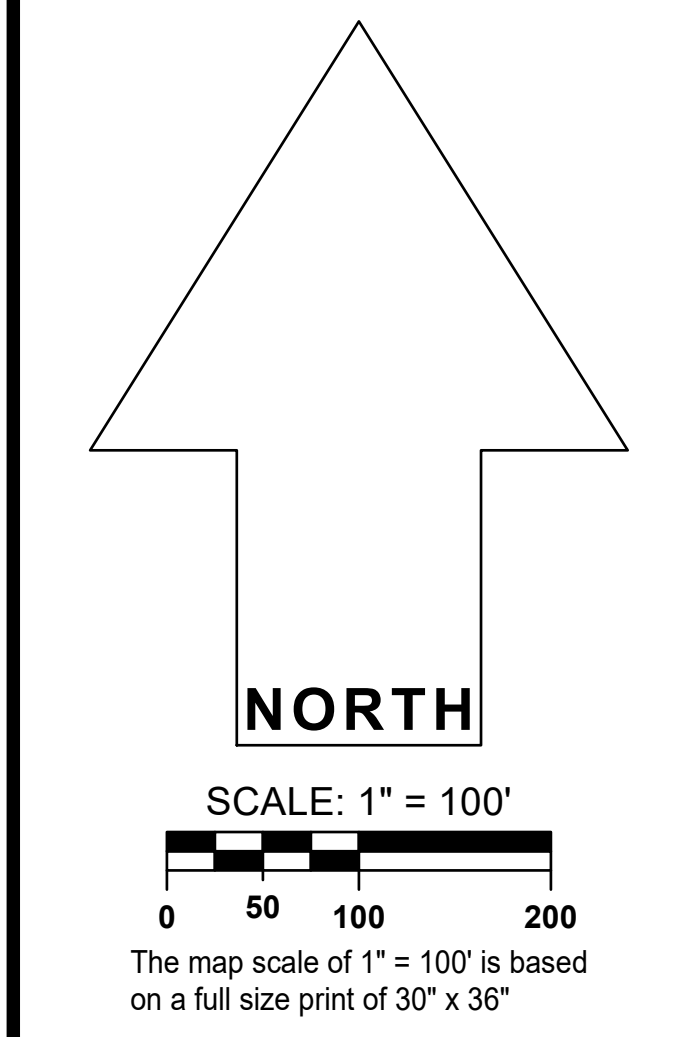
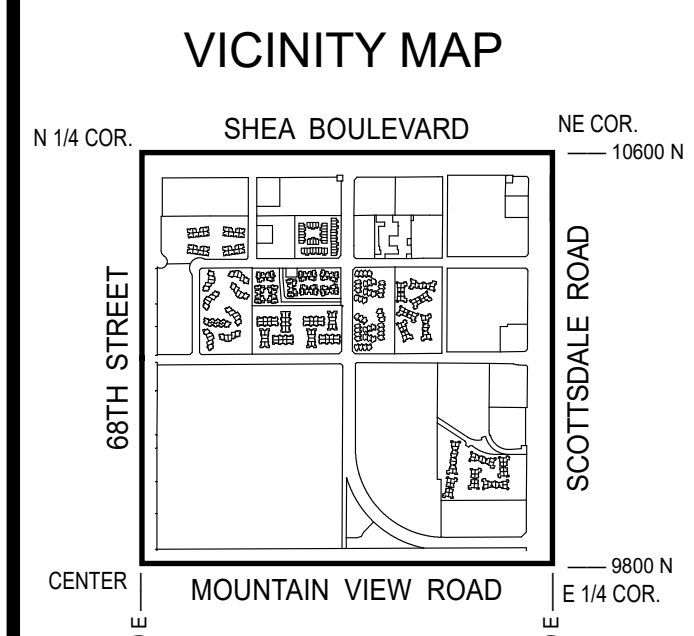
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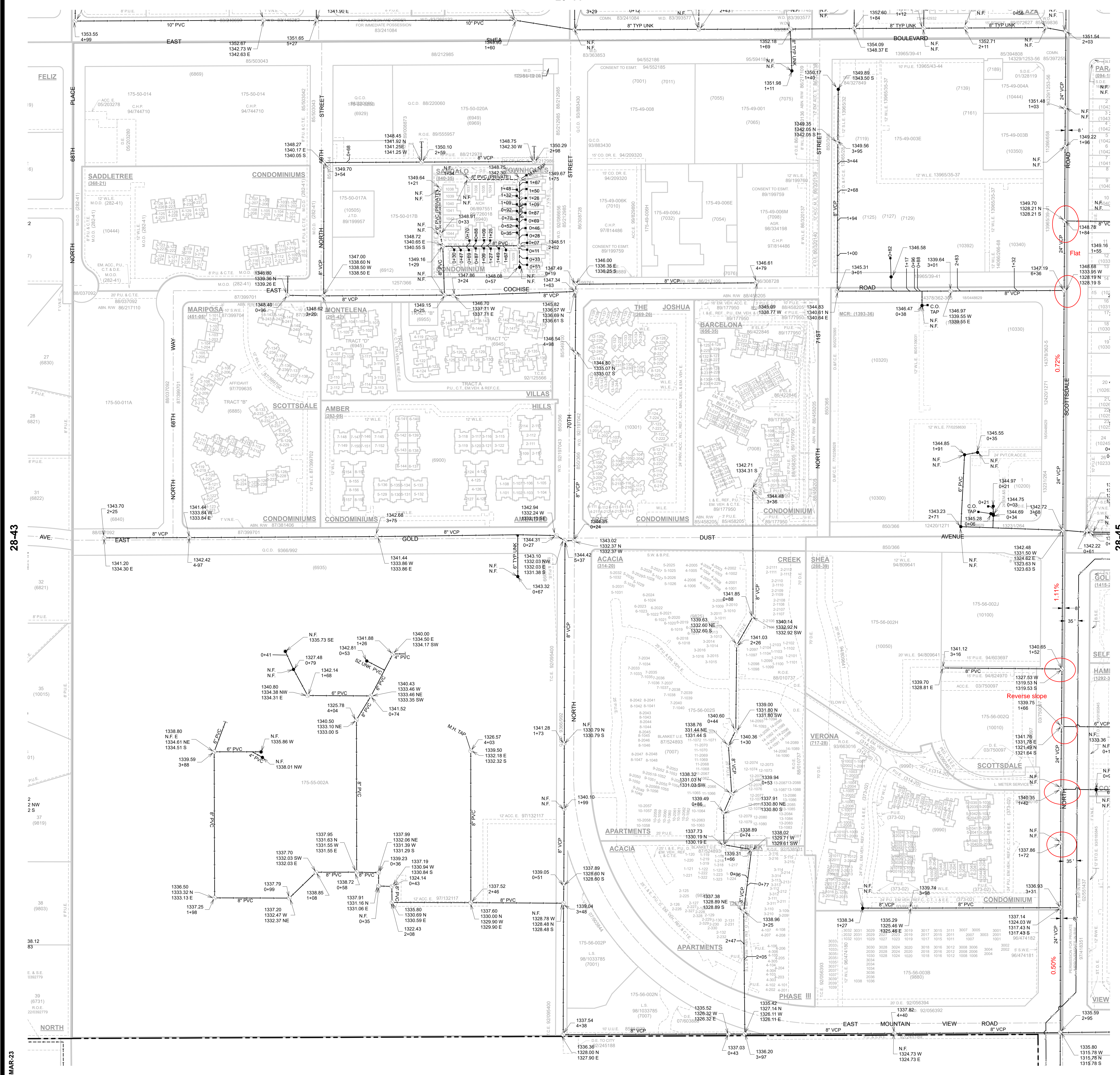
- Cleanout
- Lift Station
- Manhole
- Non-GPS Point
- Plug
- Sewer Service Point
- Sewer Tap Point
- Sewer Valve
- Treatment Plant
- Sewer Main - Gravity
- Sewer Main - Force
- Sewer Main - Private



SEWER QUARTER SECTION MAP

28-44
NE 1/4 SEC. 27 T3N R4E

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

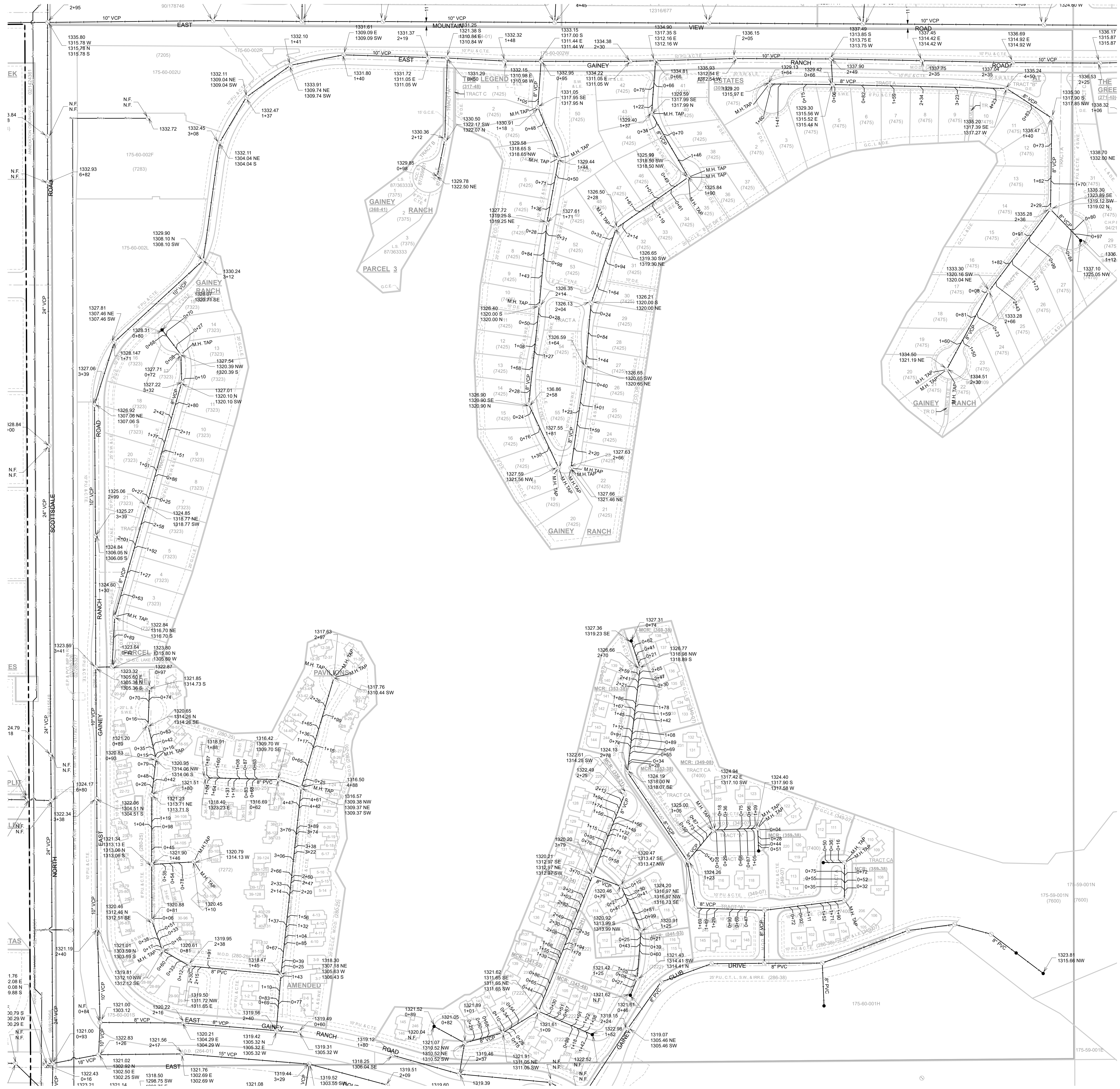


NOTIC E
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 THE CITY OF SCOTTSDALE
 26-MAR-23

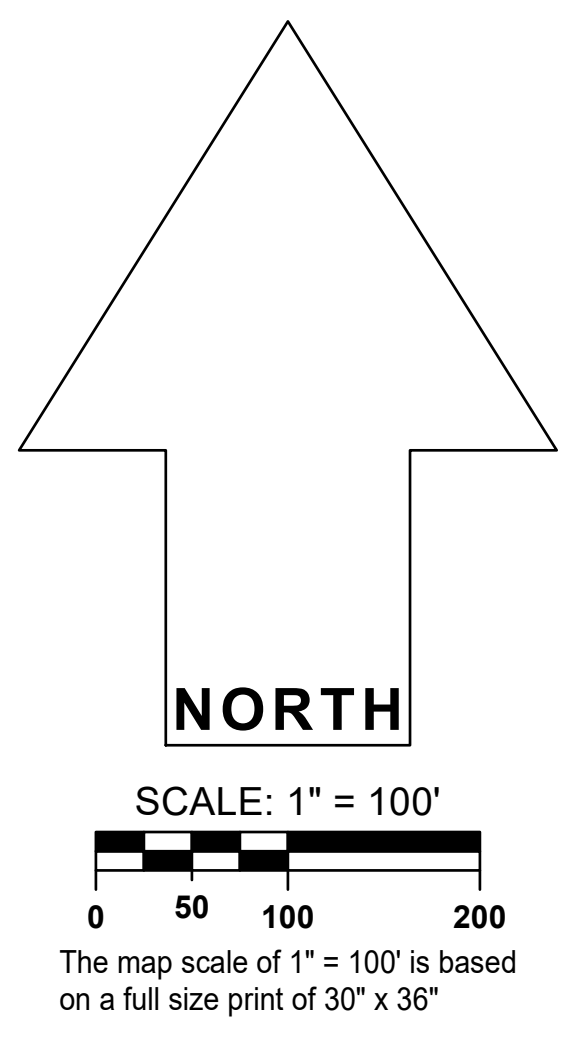
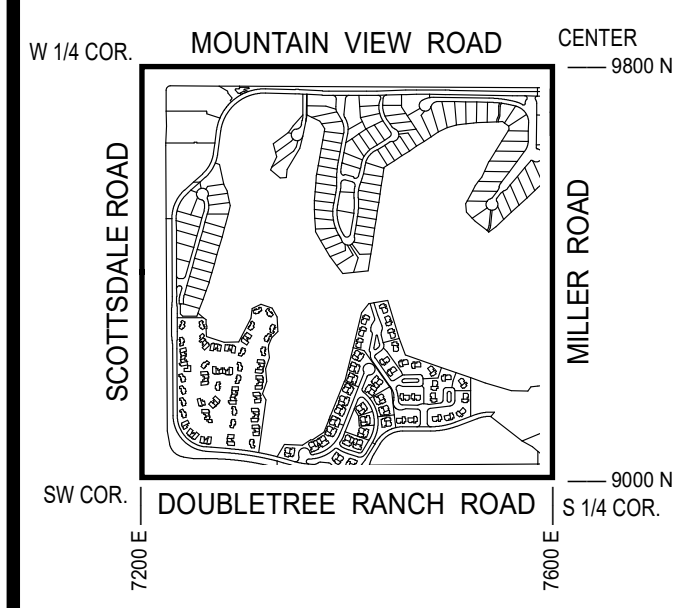
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LEGEND:

- 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



VICINITY MAP



SEWER QUARTER SECTION MAP

27-45

SW 1/4 SEC. 26 T3N R4E

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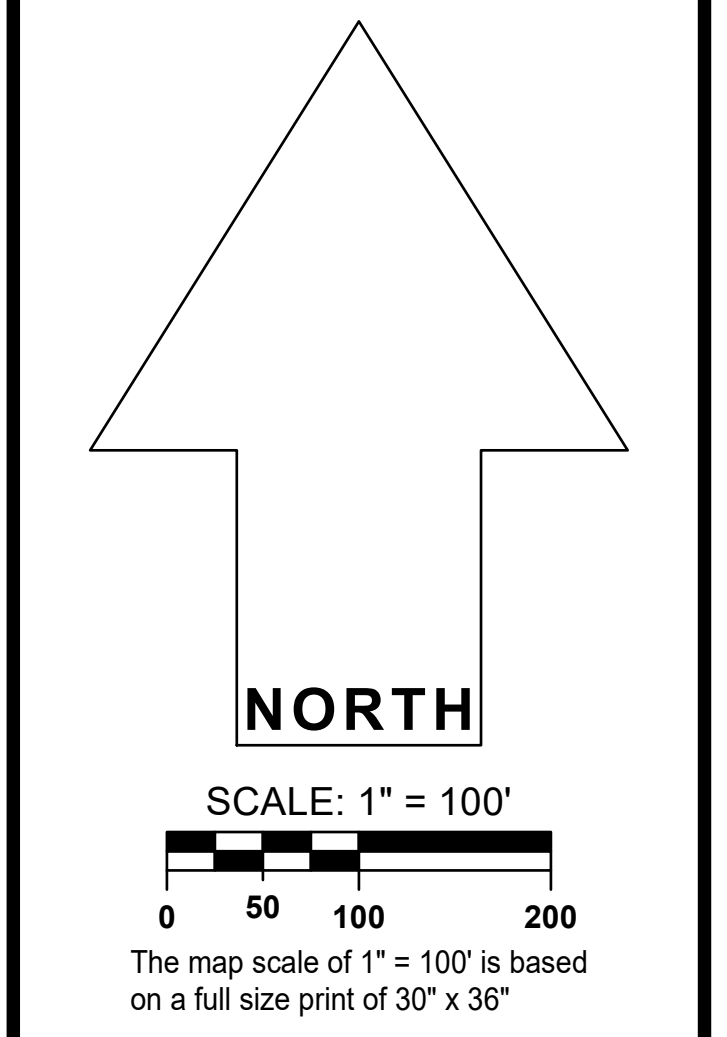
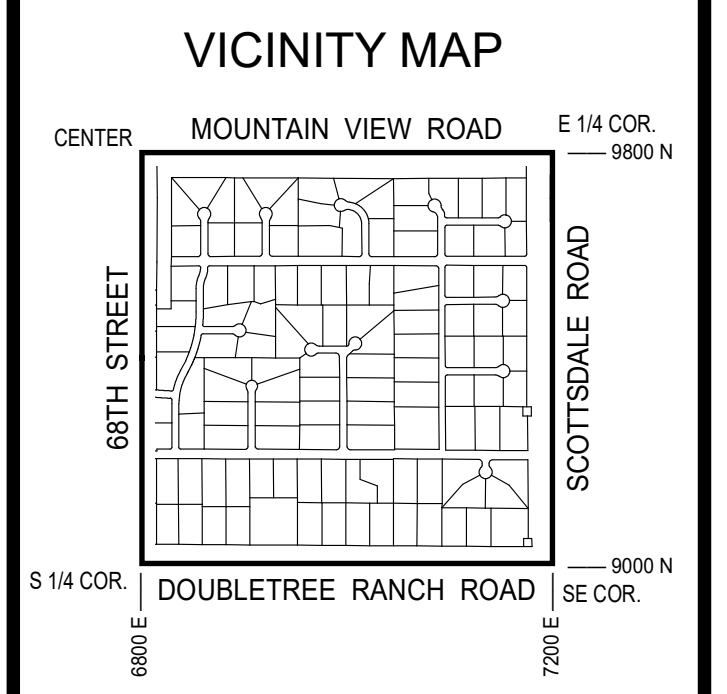
27-44

27-46

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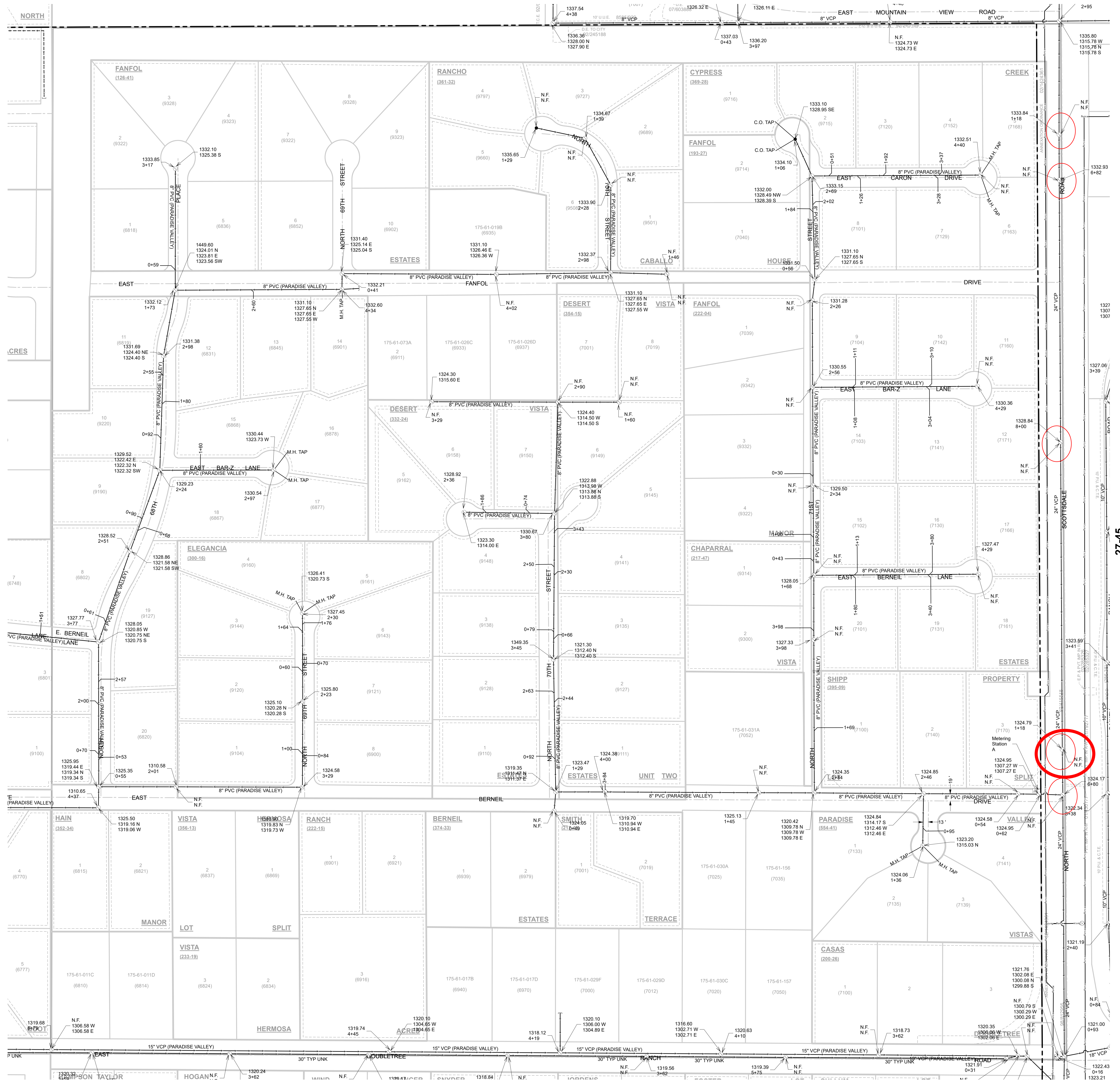
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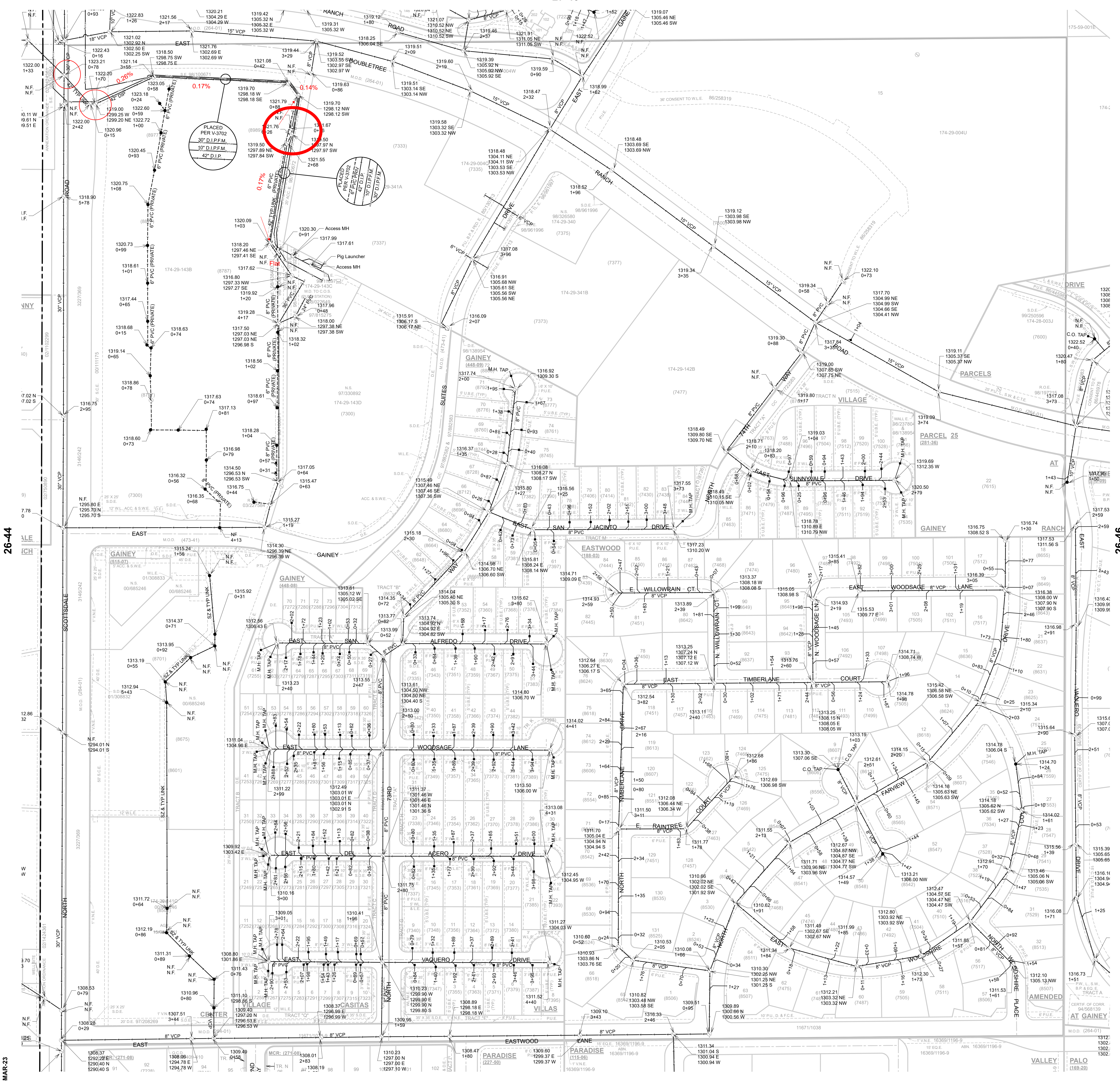
- Cleanout
- Lift Station
- Manhole
- Non-GPS Point
- Plug
- Sewer Service Point
- Sewer Tap Point
- Sewer Valve
- Treatment Plant
- Sewer Main - Gravity
- Sewer Main - Force
- Sewer Main - Private



SEWER
 QUARTER SECTION MAP
27-44
 SE 1/4 SEC. 27 T3N R4E

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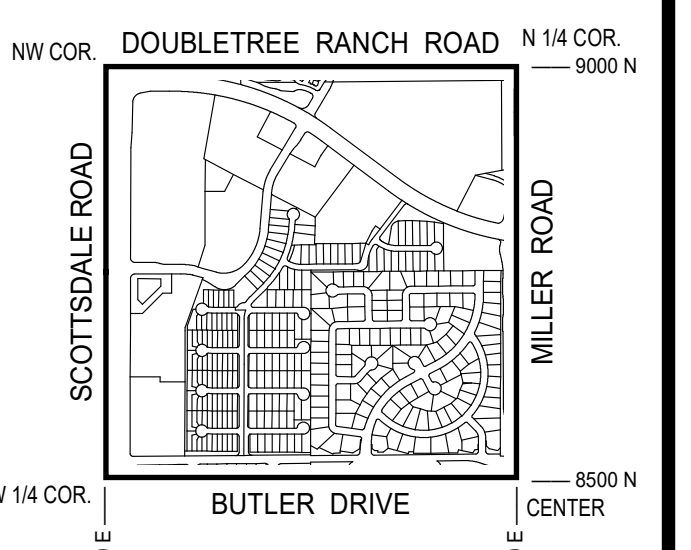
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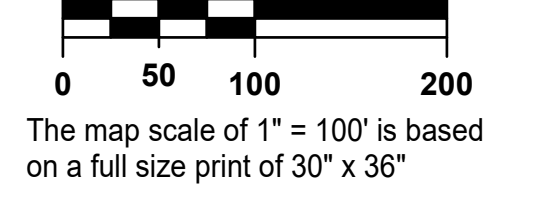
- Cleanout
- Lift Station
- Manhole
- Non-GPS Point
- Plug
- Sewer Service Point
- Sewer Tap Point
- Sewer Valve
- Treatment Plant
- Sewer Main - Gravity
- Sewer Main - Force
- Sewer Main - Private

VICINITY MAP



NORTH

SCALE: 1" = 100'



SEWER QUARTER SECTION MAP

26-45

NW 1/4 SEC. 35 T3N R4E

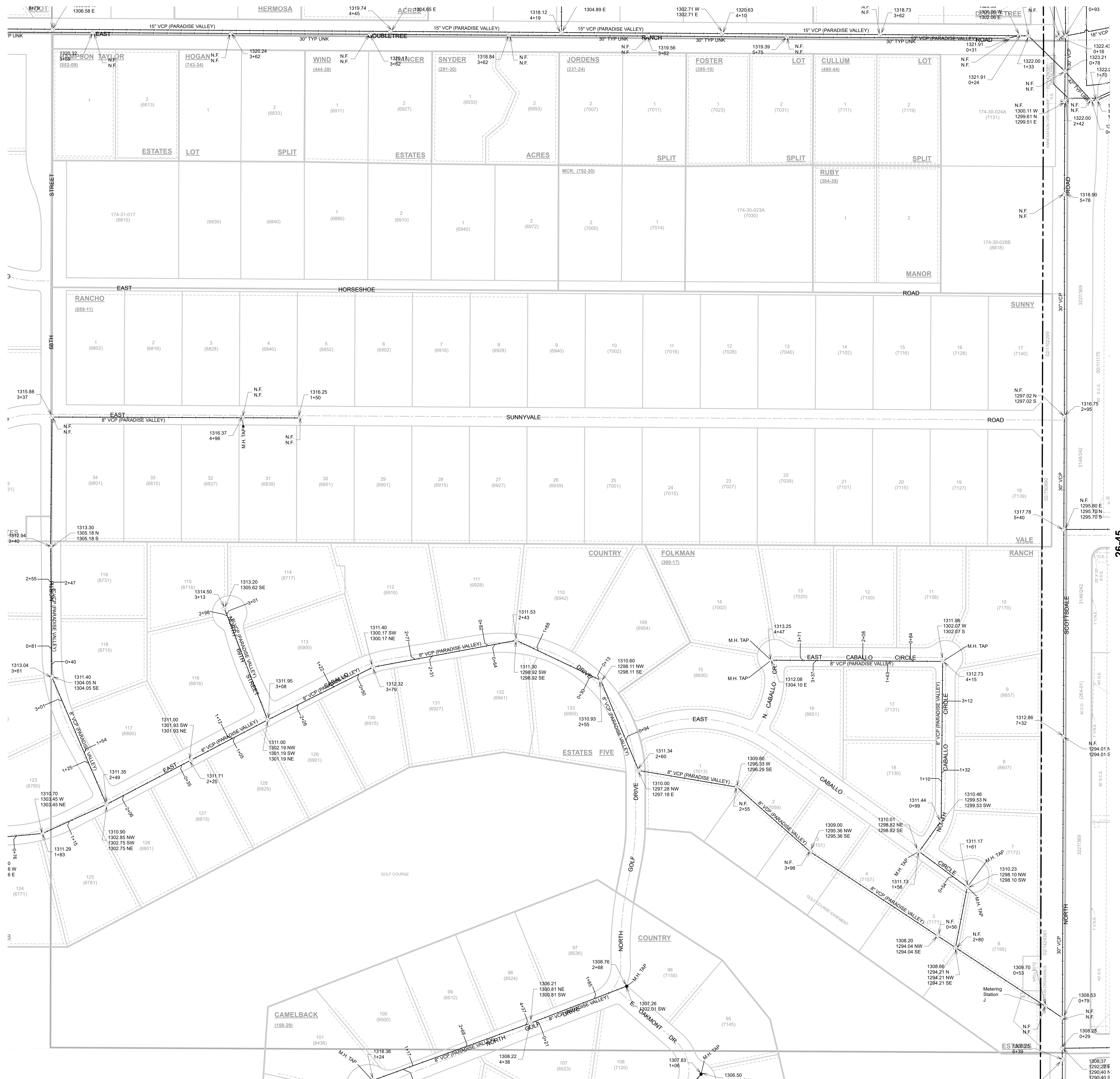
FIGURE 4

SCOTTSDALE GEOGRAPHIC INFORMATION SYSTEMS
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26-44

26-46

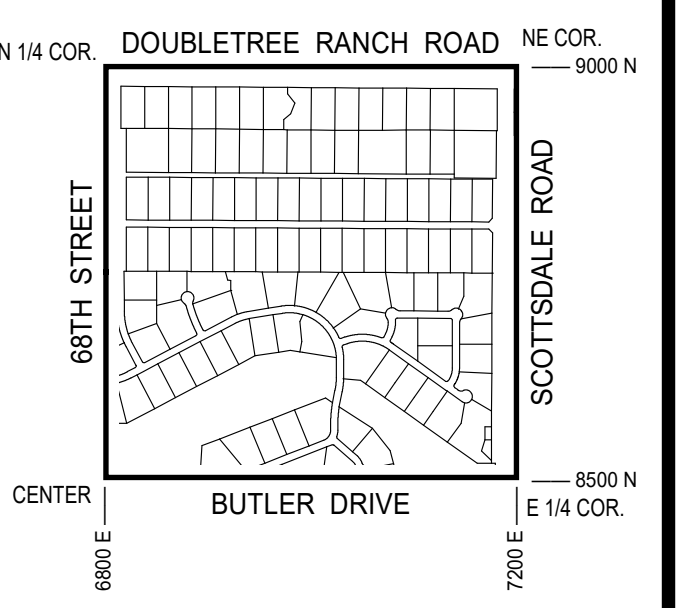


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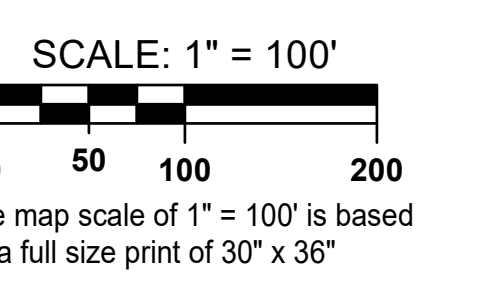
LEGEND:

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



NORTH



SEWER QUARTER SECTION MAP

26-44

NE 1/4 SEC. 34 T3N R4E

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NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where Base Flood Elevations (BFEs) and/or Floodways have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was Arizona State Plane Central zone (FIPSZONE 0002). The horizontal datum was NAD 83 HARN, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988 (NAVD 88). These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. Map users wishing to obtain flood elevations referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29) may use the following Maricopa County website application: <http://www.fcd.maricopa.gov/Maps/gismaps/aps/aps/aps/application/index.cfm>

This web tool allows users to obtain point-specific datum conversion values by zooming in and hovering over a VERTCON checkbox on the layers menu on the left side of the screen. The VERTCON grid referenced in this web application was also used to convert existing flood elevations from NGVD 29 to NAVD 88.

To obtain current elevation, description, and/or location information for National Geodetic Survey bench marks shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>. To obtain information about Geodetic Densification and Cadastral Survey bench marks produced by the Maricopa County Department of Transportation, please visit the Flood Control District of Maricopa County website at <http://www.fcd.maricopa.gov/Maps/gismaps/aps/aps/aps/application/index.cfm>.

Base map information shown on this FIRM was derived from multiple sources. Aerial imagery was provided in digital format by the Maricopa County Department of Public Works, Flood Control District. The imagery is dated October 2009 to November 2009. Additional National Aerial Imagery Program (NAIP) imagery was provided by the Arizona State Land Department (ALRS) and is dated 2007. The coordinate system used for the production of the digital FIRM is State Plane Arizona Central NAD83 HARN, International Feet.

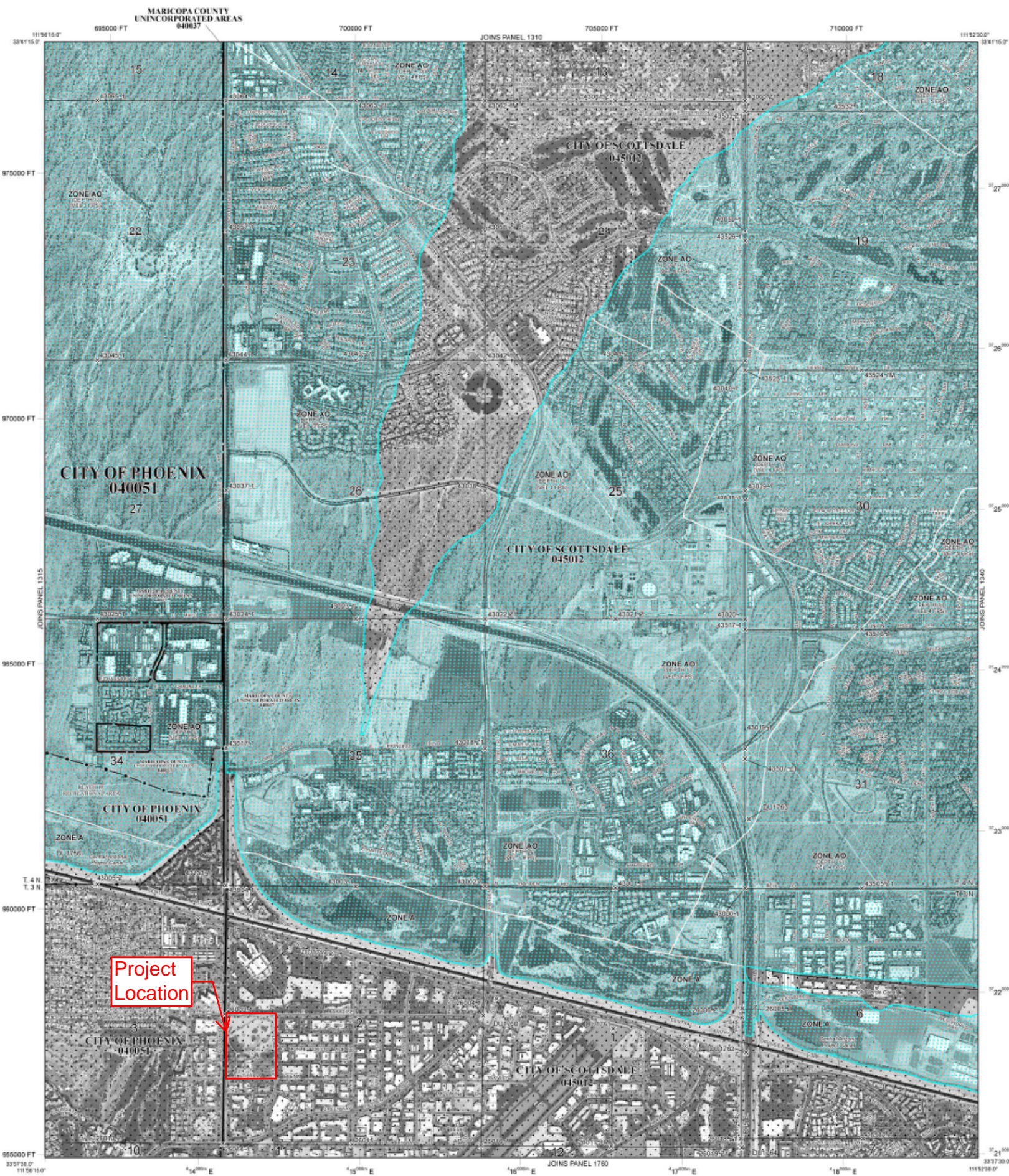
The profile base line depicted on this map represents the hydraulic modeling baselines that match flood profiles in the FIS report. As a result of improved topographic data, the profile base line, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed Map Index for an overview map of the county showing the layout of map panels, community map repository addresses, and a Listing of Communities table containing National Flood Insurance Program dates for each community, as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM, visit the FEMA Map Service Center (MSC) website at <http://mfc.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have questions about this map, how to order products, or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange (FMIX) at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov>.



LEGEND

- SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD
- The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equalled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, AV, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.
- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponds); Base Flood Elevation determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined; for areas of elevated flood velocities, depths are also determined.
- ZONE AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently abandoned. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE AV** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; the Base Flood Elevation determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.
- FLOODWAY AREAS IN ZONE AE
- The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.
- OTHER FLOOD AREAS
- ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with average areas less than 3 square miles; and areas protected by levees from 1% annual chance flood.
- ZONE D** Areas determined to be outside the 0.2% annual chance floodplain. Areas in which flood hazards are undetermined, but possible.
- COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS
- OTHERWISE PROTECTED AREAS (OPAs)
- CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.
- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities
- Base Flood Elevation line and value; elevation in feet
- Base Flood Elevation value where different within same elevation in feet
- * Referenced to the North American Vertical Datum of 1988 (NAVD 88)
- Cross section line
- Transect line
- Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 1000-meter Universal Transverse Mercator grid ticks, zone 12
- 500-foot grid ticks; Arizona State Plane coordinate system, central zone (FIPSZONE 0002); Transverse Mercator
- Bench mark (see explanation in Notes to Users section of this FIRM panel)
- River Mile
- MAP REPOSITORIES**
- Refer to Map Repositories list on Map Index
- EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP**
- April 15, 1988
- EFFECTIVE DATES OF REVISIONS TO THIS PANEL**
- December 3, 1993 September 26, 1995 July 19, 2001 September 26, 2005
- October 16, 2013 - to add base flood elevation, to add special flood hazard areas, to incorporate previously issued letters of map change, to add roads and road names, to update corporate limits, to change floodway, to advance to BFE, to change base flood elevations, and to add floodway.
- For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.
- To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-438-6428.

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1320L

FIRM FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 1320 OF 4425
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	04001	1320	L
PHOENIX, CITY OF	04001	1320	L
SCOTTSDALE, CITY OF	04012	1320	L

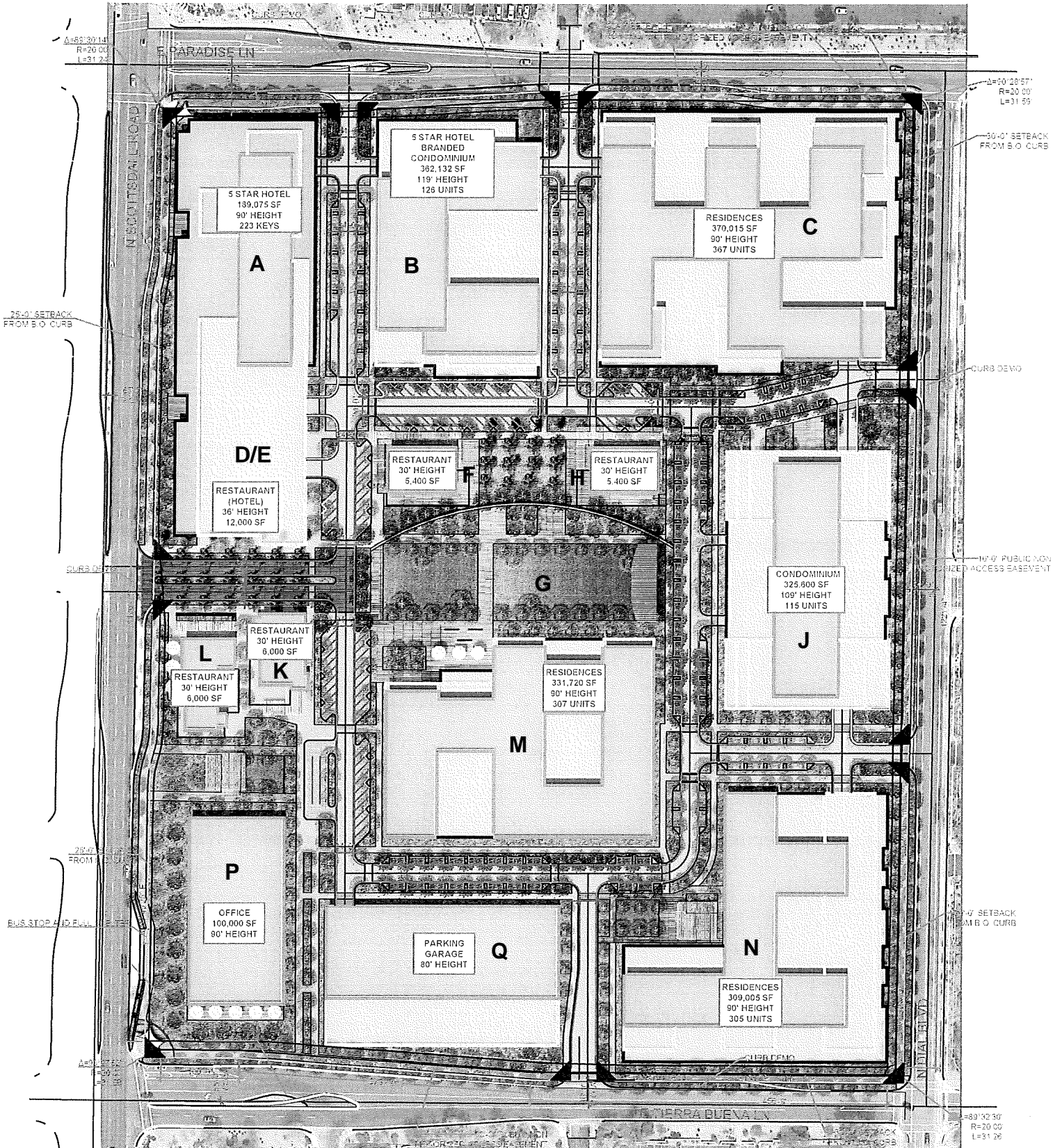
FIGURE 5

NATION USER: The Map Number above should be used when placing map orders. The Community Number above should be used on insurance applications for the subject community.

MAP NUMBER 04013C1320L
MAP REVISION OCTOBER 16, 2013

Federal Emergency Management Agency

Project Location

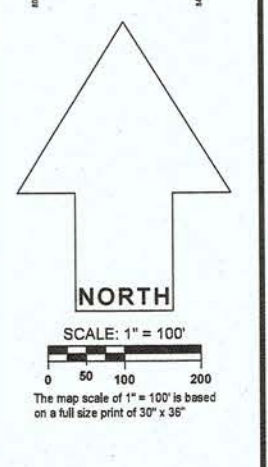


**FIGURE 6 -
Conceptual Site Plan**

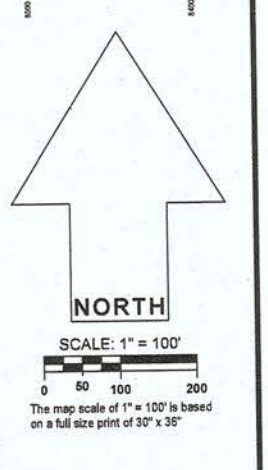
APPENDICES:

- 1-Wastewater Basin Areas to Greenway-Hayden*
- 2-Sewer Monitoring Summaries*
- 3-Onsite Hydraulic Calculations*
- 4-100-Year Rainfall Event at Park Village*
- 5-Combined Offsite Flows*
- 6-Offsite Hydraulic Calculations*
- 7-Utility Exhibit*
- 8-Conceptual Phasing Plan*
- 9-Waste Water Management Principles*

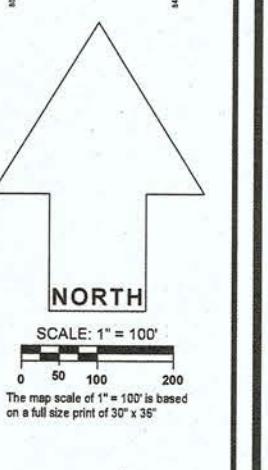
- Control
- Life Station
- Manhole
- Manhole Flag
- Manhole Plug
- Service Point
- Service Tap
- Service Valve
- Service Valve - Break
- Service Valve - Close
- Service Valve - Phase



- Control
- Life Station
- Manhole
- Manhole Flag
- Manhole Plug
- Service Point
- Service Tap
- Service Valve
- Service Valve - Break
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- Service Valve - Phase

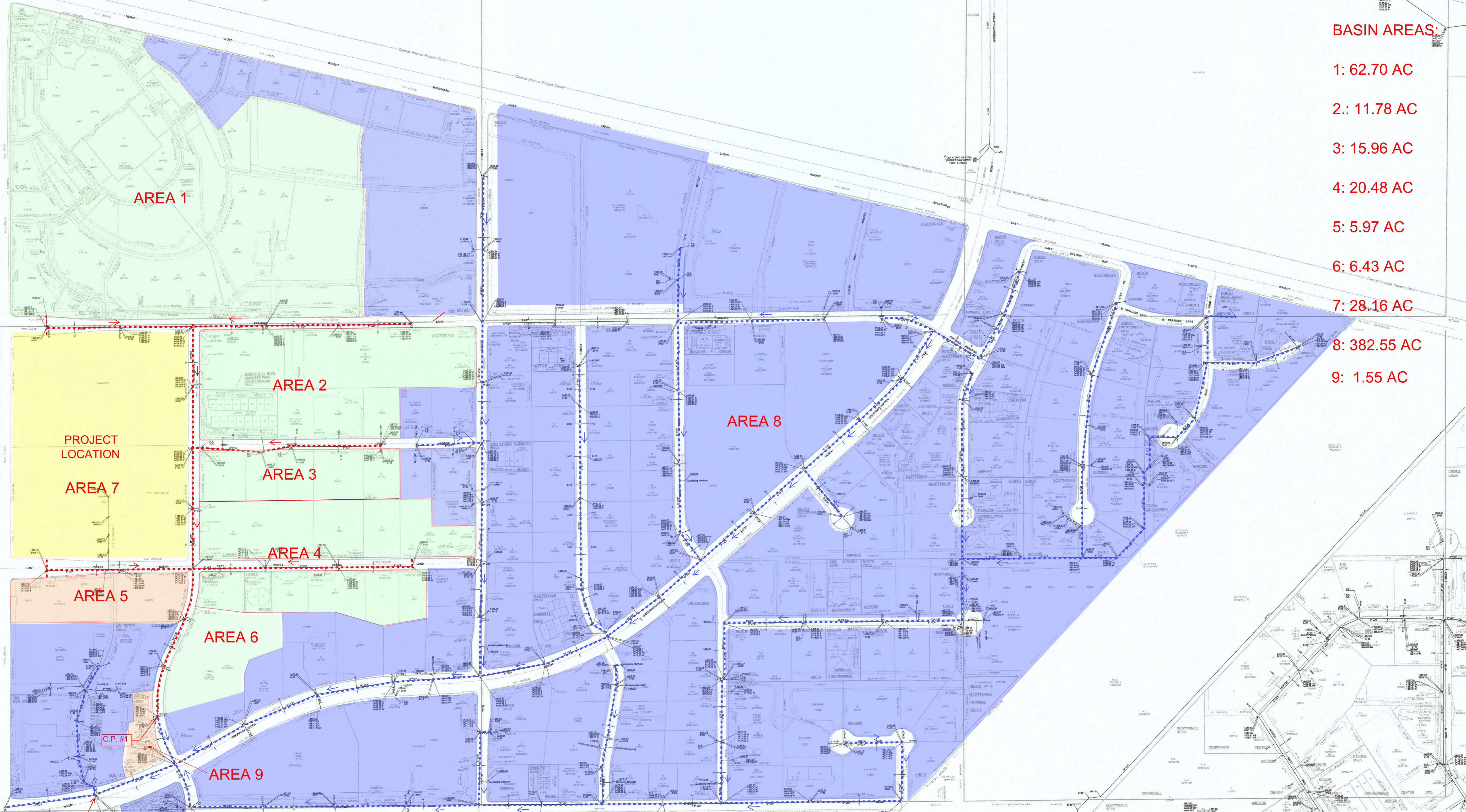


- Control
- Life Station
- Manhole
- Manhole Flag
- Manhole Plug
- Service Point
- Service Tap
- Service Valve
- Service Valve - Break
- Service Valve - Close
- Service Valve - Phase



BASIN AREAS:

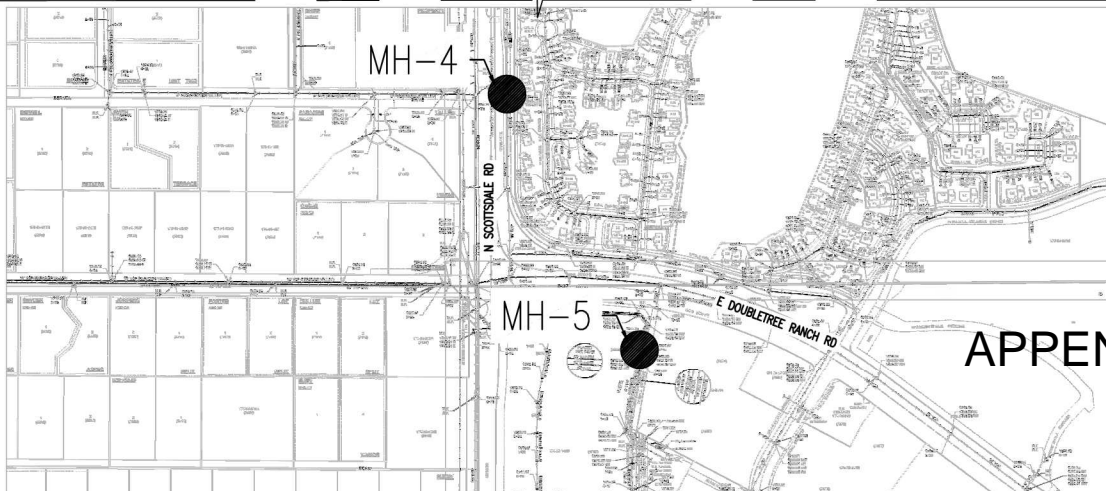
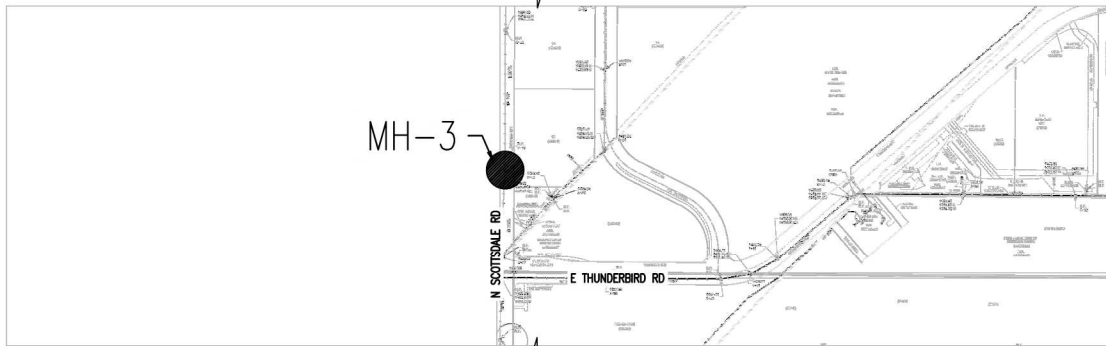
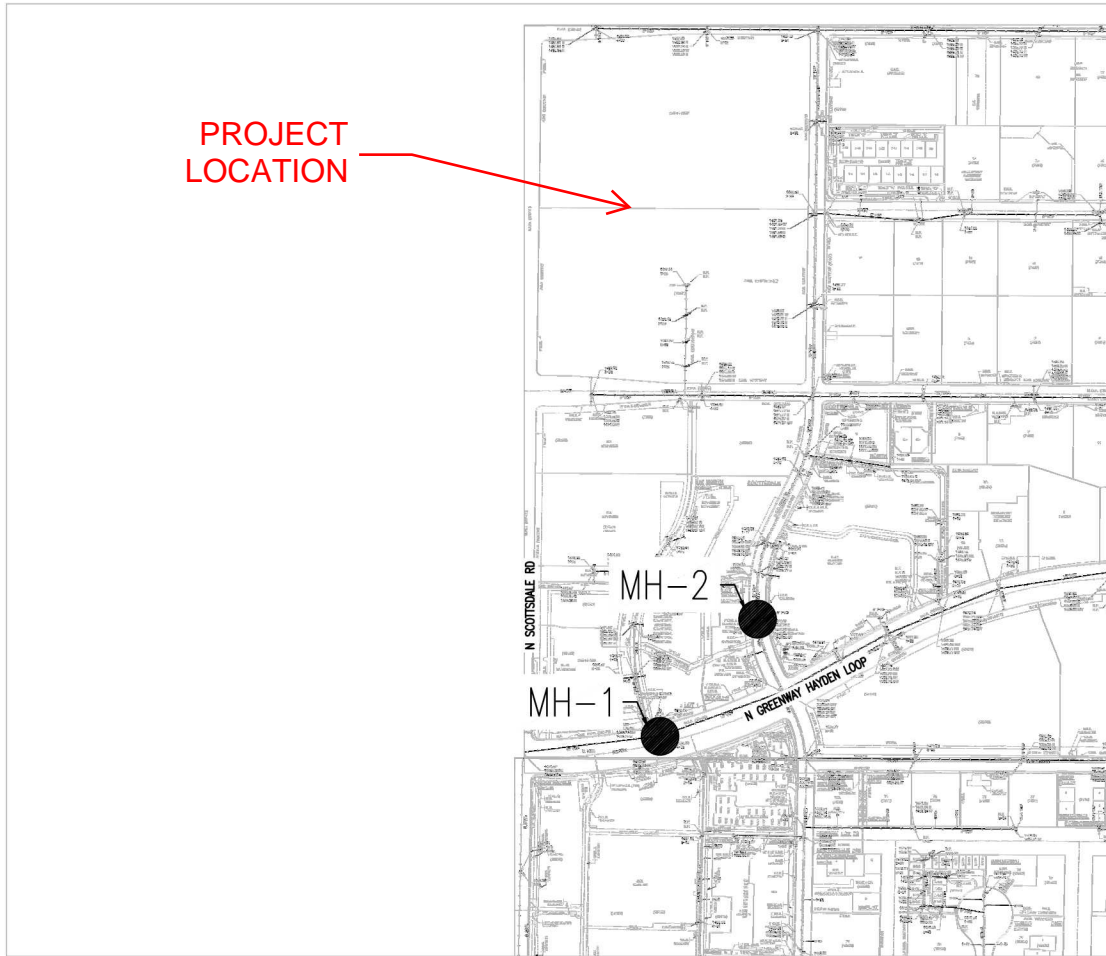
- 1: 62.70 AC
- 2: 11.78 AC
- 3: 15.96 AC
- 4: 20.48 AC
- 5: 5.97 AC
- 6: 6.43 AC
- 7: 28.16 AC
- 8: 382.55 AC
- 9: 1.55 AC



LEGEND

- Project Site to new Dial Blvd Sewer
- Off-site Contribution area to Control Point 1
- Off-site Contribution area to Greenway-Hayden Sewer
- Proposed Reconnection to New Dial Blvd Sewer

**SANITARY SEWER
 CONTRIBUTION AREA MAP
 APPENDIX I**

PROJECT
LOCATION

APPENDIX II



SL1500 RDH Flow Study for SEG

Doug Mann

SEG

5240 N. 16th St., Suite 105, Phoenix, AZ 85016

SL1500 RDH Flow Study, 2 sites total in Scottsdale, AZ from Friday 06-09-23 to Monday 06-19-23.

Equipment for Site: Hach 901 Logger with Flo-Dar Sensor (Area Velocity).

The equipment was installed on Friday, 06/09/23 with confined space entry, pipe size confirmed, sensor calibrated, and level depth confirmed to the flow level.

Duration of monitoring: 9-days including 2 weekends

Monitor: Flow (gpm), Level (in), and Velocity (fps)

Data logging: 5-minute intervals (No averaged intervals)

Calibration Performed: Calibration method using 10.50-inch target.

Target Measure: 10.50 in Meter Read: 10.51 in 6/09/2023 09:27 am

Meter Validation: PASSED

Location #1 located on N. Greenway Hayden Loop East of N. Scottsdale Rd.

75" Diameter, Rim to Invert: 215.00 inches

18" VCP pipe, flowing West

One 8" Lateral pipe from the North.

The pipe condition is intact and reasonably clean.

Scum line of 3.5 inches

Flo-Dar installed pointing upstream in the 18" pipe channel.

Flow Data is valid having no missing, erroneous, or anomalies with data.

Attached is a MS Excel summary showing level, velocity, and flow logged at 5-minute intervals during the monitoring period.

RDH Environmental Services

Jeff Schulte

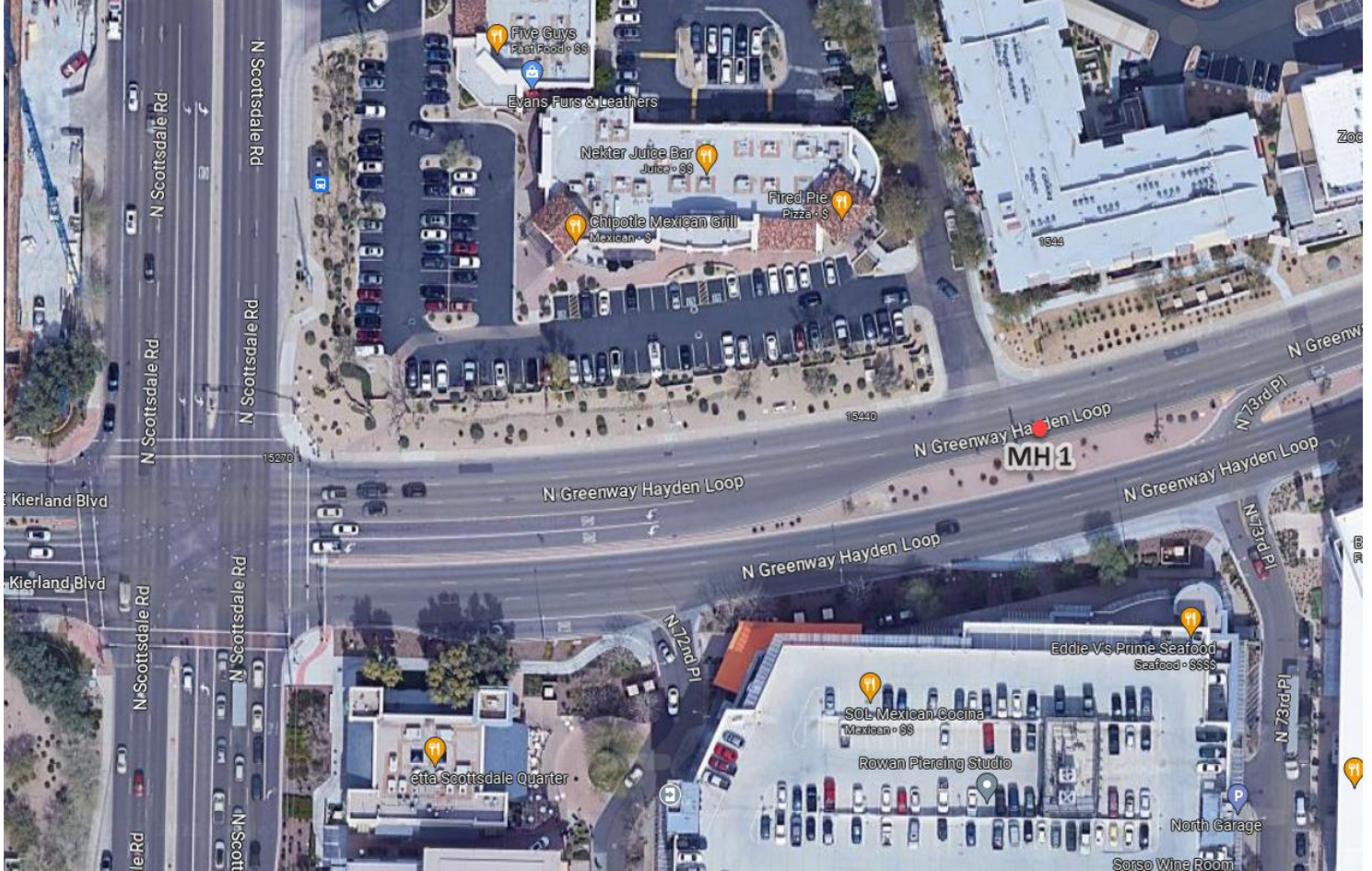
Operations Manager

servicemanager@rdh-env.com

APPENDIX II

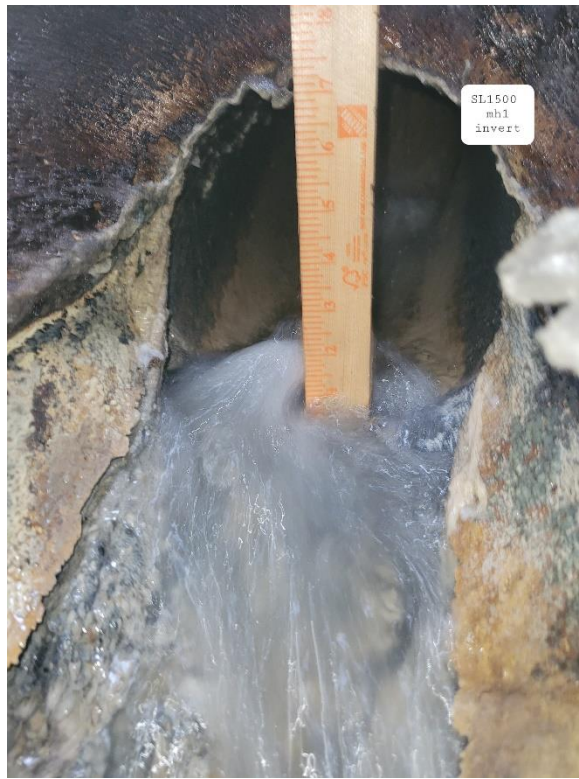
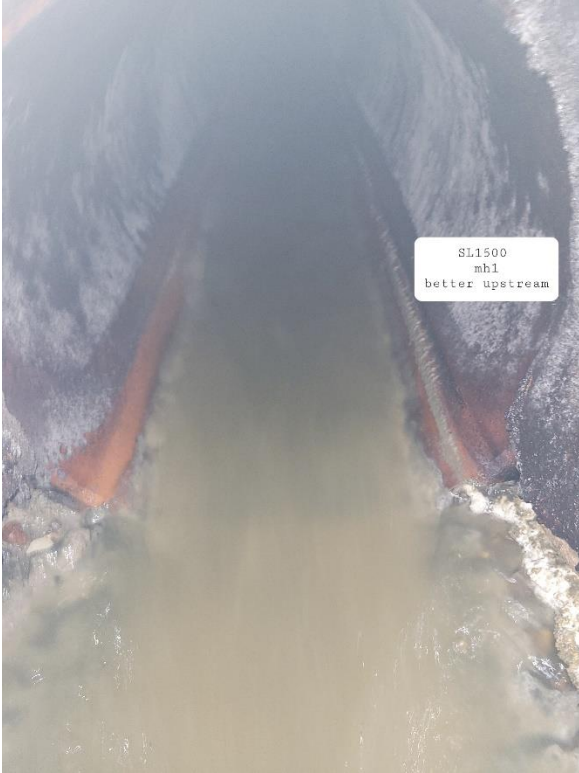
SL1500 RDH Flow Study for SEG

Site Map:



SL1500 RDH Flow Study for SEG

Pictures:





SL1500 RDH Flow Study for SEG

Period Summaries:

SEG COS MH1 Period Summary: Flow				
Measures	Value	Unit	Date	Time
Max.	394.19	gpm	Friday, June 16, 2023	2:00 PM
Min.	81.71	gpm	Sunday, June 11, 2023	5:25 AM
Avg.	209.26	gpm		
Total	3,022,727.57	gal		

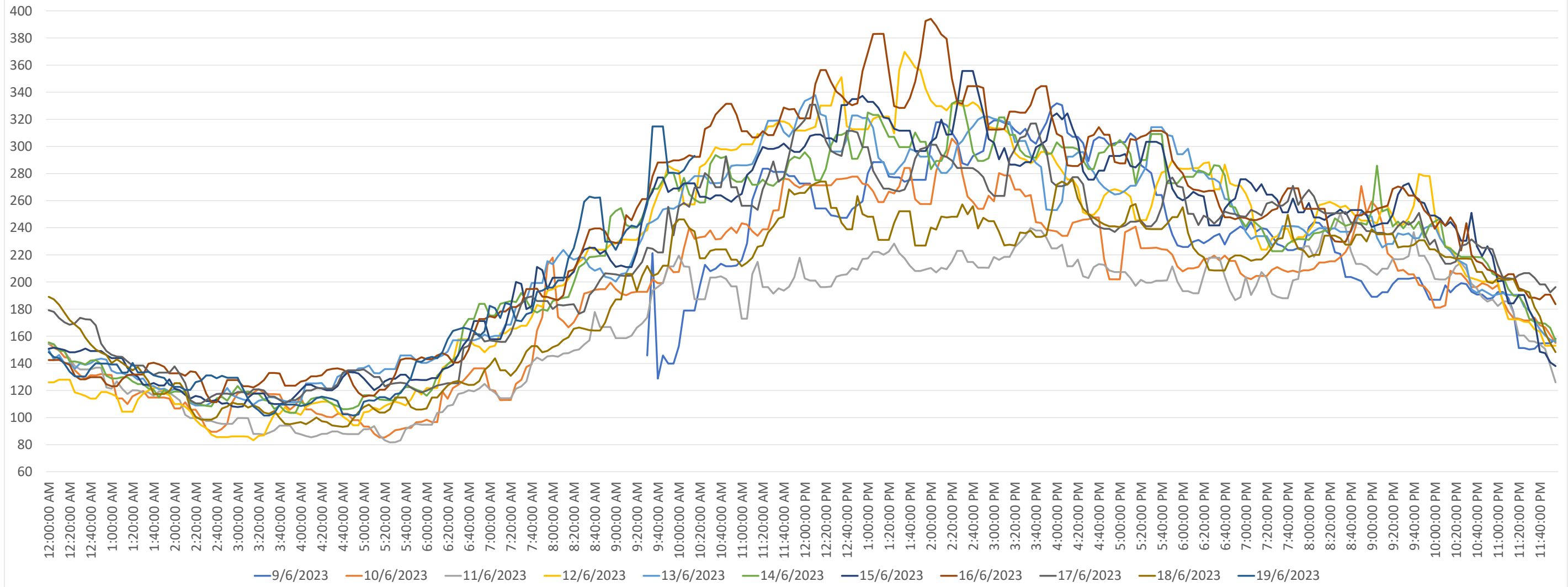
SEG COS MH1 Period Summary: Level				
Measures	Value	Unit	Date	Time
Max.	3.61	in	Friday, June 16, 2023	1:05 PM
Min.	1.70	in	Sunday, June 11, 2023	5:25 AM
Avg.	2.61	in		

SEG COS MH1 Period Summary: Velocity				
Measures	Value	Unit	Date	Time
Max.	3.50	fps	Friday, June 16, 2023	1:50 PM
Min.	2.09	fps	Monday, June 12, 2023	2:40 AM
Avg.	2.85	fps		

*Data begins at 9:30 am on June 9th and ends at 10:15 am on June 19th.

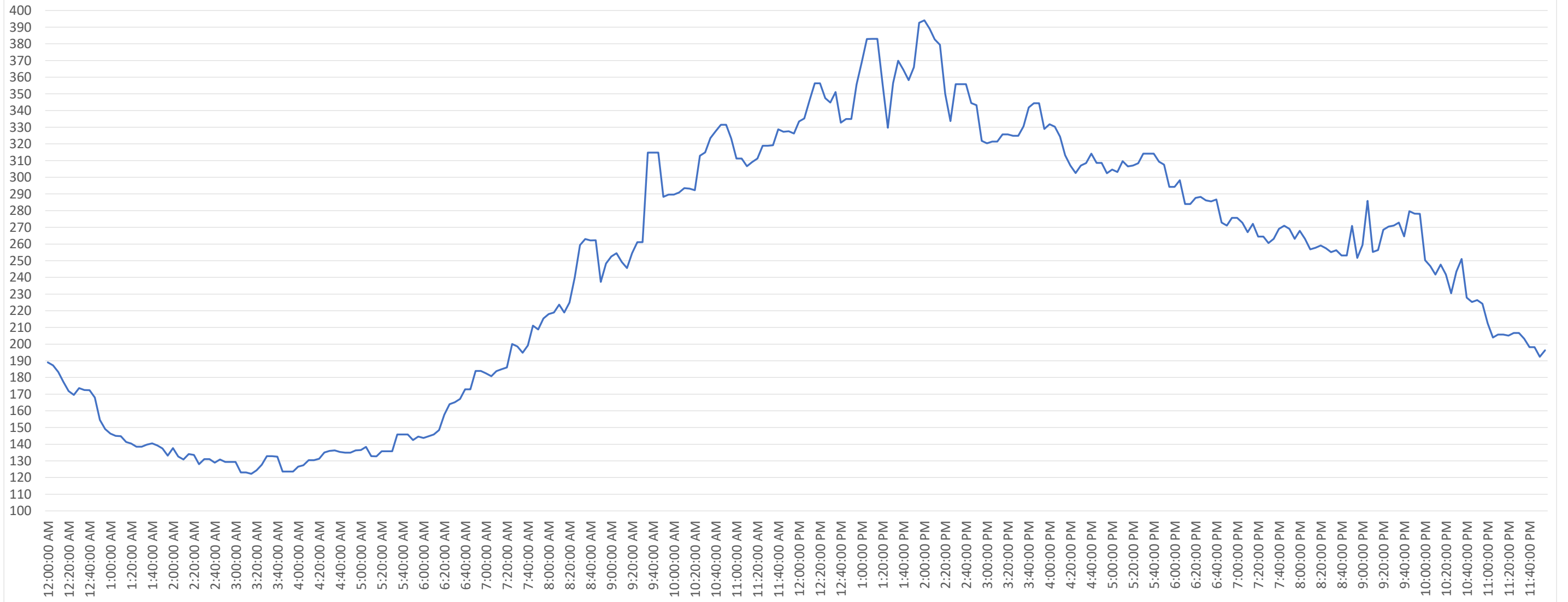
FLOW STUDY FOR PARK VILLAGE - SCOTTSDALE

MH-1
09/06/23 TO 19/06/23



FLOW STUDY FOR PARK VILLAGE - SCOTTSDALE

MH-1 PEAK FLOW BY HOUR





SL1500 RDH Flow Study for SEG

Doug Mann

SEG

5240 N. 16th St., Suite 105, Phoenix, AZ 85016

SL1500 RDH Flow Study, 2 sites total in Scottsdale, AZ from Friday 06-09-23 to Monday 06-19-23.

Equipment for Site: Hach 901 Logger with Flo-Dar Sensor (Area Velocity).

The equipment was installed on Friday, 06/09/23 with confined space entry, pipe size confirmed, sensor calibrated, and level depth confirmed to the flow level.

Duration of monitoring: 9-days including 2 weekends

Monitor: Flow (gpm), Level (in), and Velocity (fps)

Data logging: 5-minute intervals (No averaged intervals)

Calibration Performed: Calibration method using 6.00-inch target.

Target Measure: 6.00 in Meter Read: 6.03 in 6/09/2023 08:23 am

Meter Validation: PASSED

Location #2 located on N. Dial Blvd North of N. Greenway Hayden Loop

72" Diameter, Rim to Invert: 100.00 inches

10" VCP pipe, flowing South

One 8" Lateral pipe from the East.

The pipe condition is intact and reasonably clean.

Scum line of 2.75 inches

Flo-Dar installed pointing upstream in the 10" pipe channel.

Flow Data is valid having no missing, erroneous, or anomalies with data.

Attached is a MS Excel summary showing level, velocity, and flow logged at 5-minute intervals during the monitoring period.

RDH Environmental Services

Jeff Schulte

Operations Manager

servicemanager@rdh-env.com

APPENDIX II

SL1500 RDH Flow Study for SEG

Site Map:



SL1500 RDH Flow Study for SEG

Pictures:





SL1500 RDH Flow Study for SEG

Period Summaries:

SEG COS MH2 Period Summary: Flow				
Measures	Value	Unit	Date	Time
Max.	130.40	gpm	Monday, June 12, 2023	2:25 PM
Min.	5.19	gpm	Monday, June 19, 2023	1:10 AM
Avg.	70.65	gpm		
Total	1,023,875.52	gal		

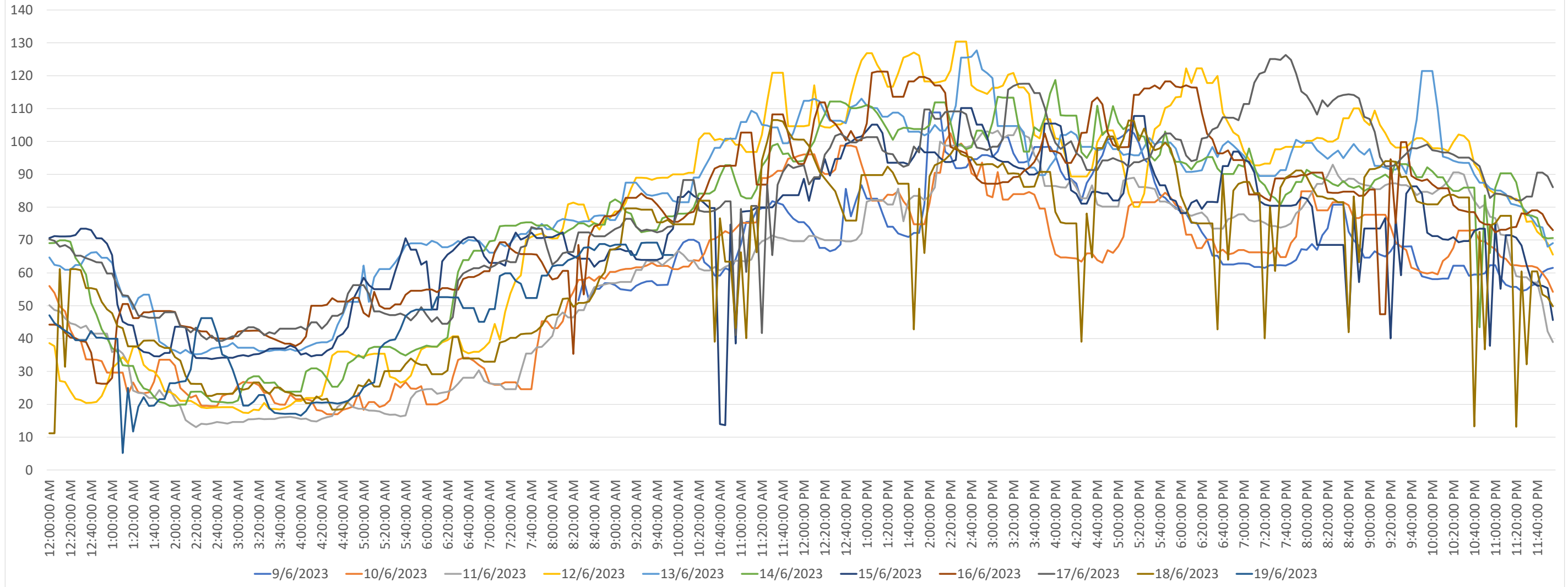
SEG COS MH2 Period Summary: Level				
Measures	Value	Unit	Date	Time
Max.	2.76	in	Monday, June 12, 2023	2:25 PM
Min.	0.75	in	Monday, June 19, 2023	1:10 AM
Avg.	2.06	in		

SEG COS MH2 Period Summary: Velocity				
Measures	Value	Unit	Date	Time
Max.	2.41	fps	Friday, June 9, 2023	2:00 PM
Min.	0.63	fps	Monday, June 19, 2023	1:10 AM
Avg.	1.84	fps		

*Data begins at 8:25 am on June 9th and ends at 9:55 am on June 19th.

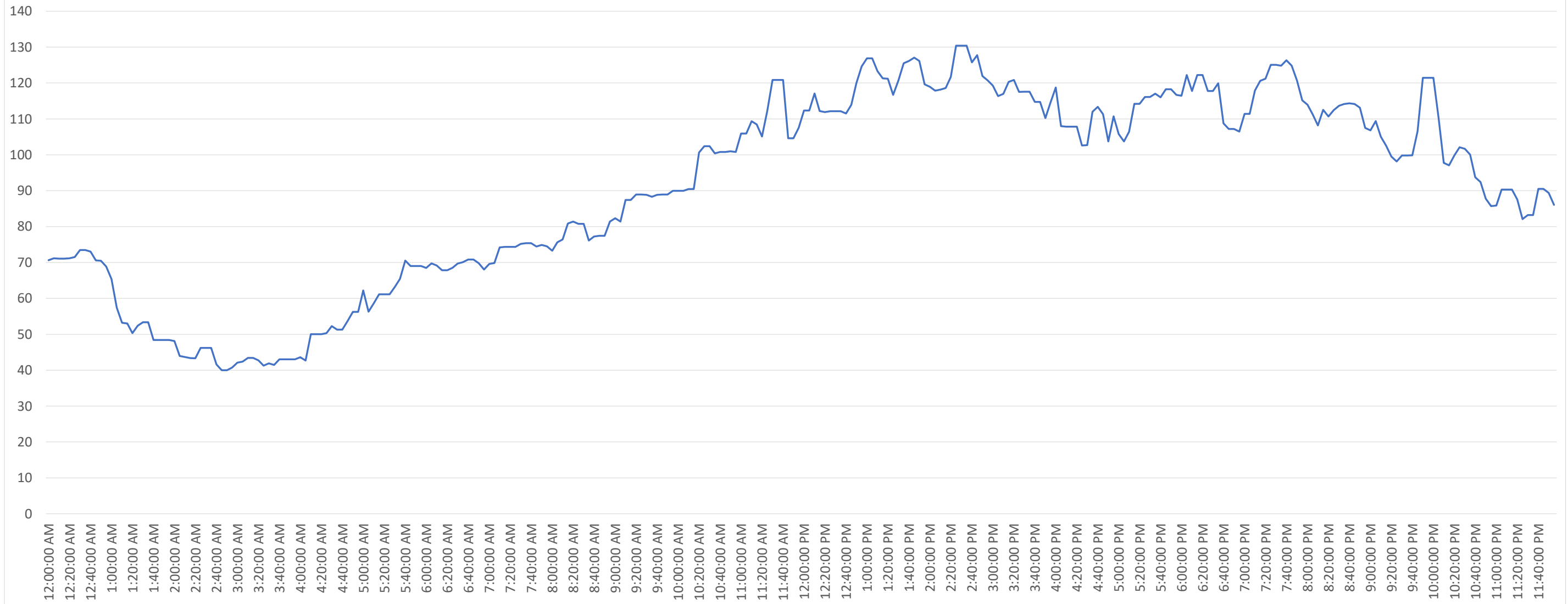
FLOW STUDY FOR PARK VILLAGE - SCOTTSDALE

MH-2
09/06/23 TO 19/06/23



FLOW STUDY FOR PARK VILLAGE - SCOTTSDALE

MH-2 PEAK FLOW BY HOUR





SL1500 RDH Flow Study for SEG

Doug Mann

SEG

5240 N. 16th St., Suite 105, Phoenix, AZ 85016

SL1500 RDH Flow Study, 3 sites total in Scottsdale, AZ from Thursday 06-08-23 to Monday 06-19-23.

Equipment for Site: Hach 901 Logger with Flo-Dar Sensor (Area Velocity).

The equipment was installed on Friday, 06/08/23 with confined space entry, pipe size confirmed, sensor calibrated, and level depth confirmed to the flow level.

Duration of monitoring: 10-days including 2 weekends

Monitor: Flow (gpm), Level (in), and Velocity (fps)

Data logging: 5-minute intervals (No averaged intervals)

Calibration Performed: Calibration method using 8.00-inch target.

Target Measure: 8.00 in Meter Read: 8.01 in 6/08/2023 08:13 am

Meter Validation: PASSED

Location #3 located on N. Scottsdale Rd North of E. Thunderbird Dr.

72" Diameter, Rim to Invert: 275.00 inches

18" VCP pipe, flowing South

No Lateral(s)

The pipe condition is intact and reasonably clean.

Scum line of 3.00 inches

Flo-Dar installed pointing upstream in the 18" pipe channel.

Flow Data is valid having no missing, erroneous, or anomalies with data.

Attached is a MS Excel summary showing level, velocity, and flow logged at 5-minute intervals during the monitoring period.

RDH Environmental Services

Jeff Schulte

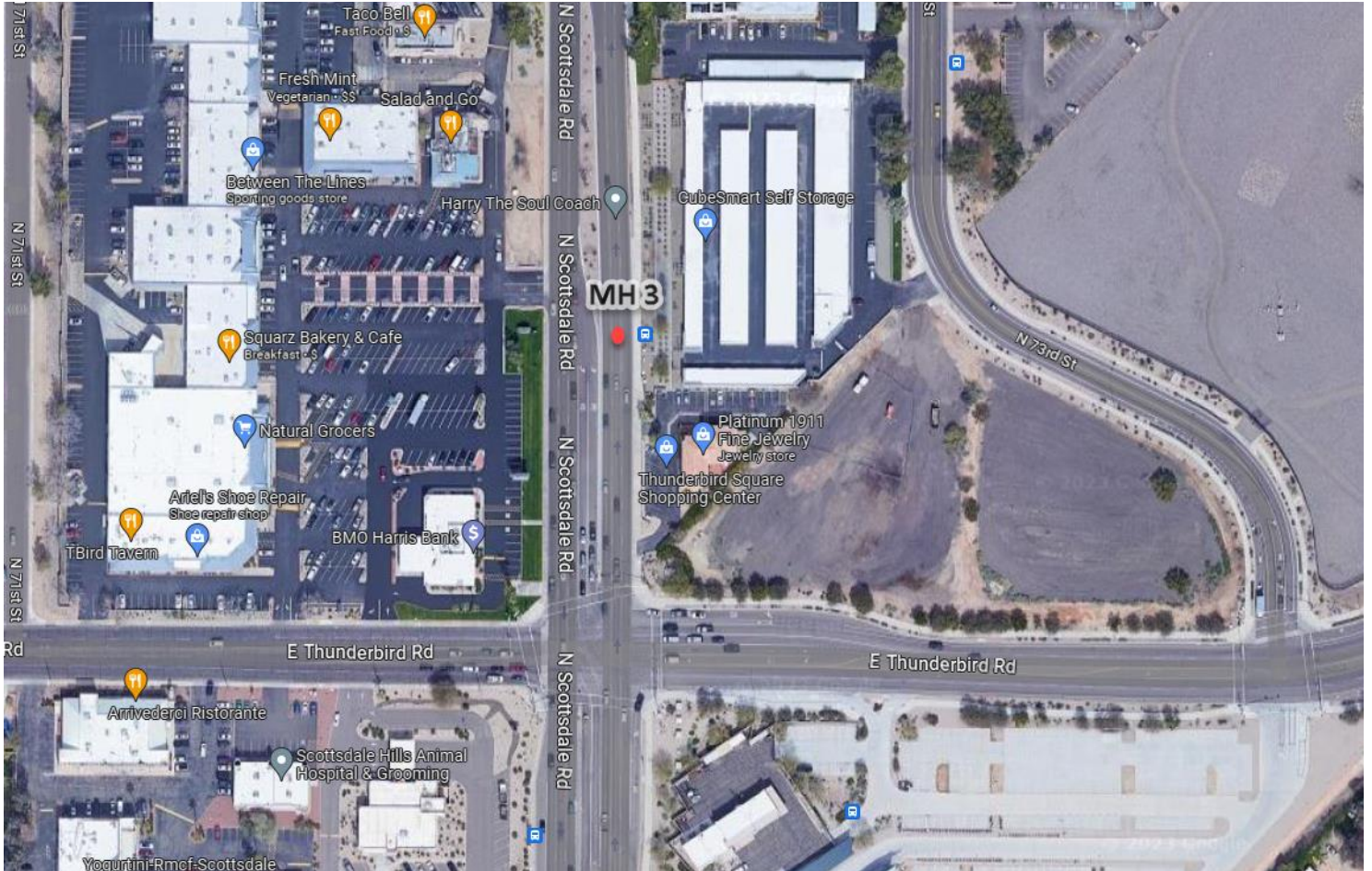
Operations Manager

servicemanager@rdh-env.com

APPENDIX II

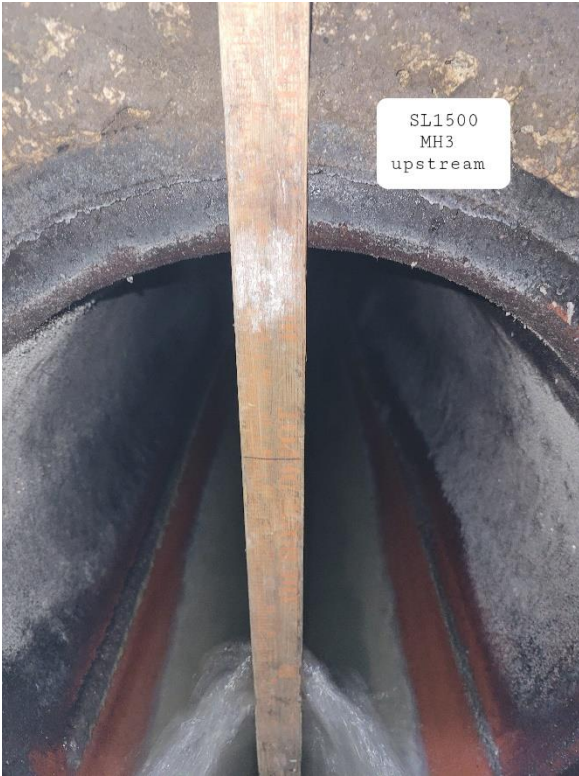
SL1500 RDH Flow Study for SEG

Site Map:



SL1500 RDH Flow Study for SEG

Pictures:





SL1500 RDH Flow Study for SEG

Period Summaries:

SEG COS MH3 Period Summary: Flow				
Measures	Value	Unit	Date	Time
Max.	416.01	gpm	Friday, June 16, 2023	2:05 PM
Min.	53.97	gpm	Friday, June 9, 2023	3:25 AM
Avg.	207.70	gpm		
Total	3,273,331.25	gal		

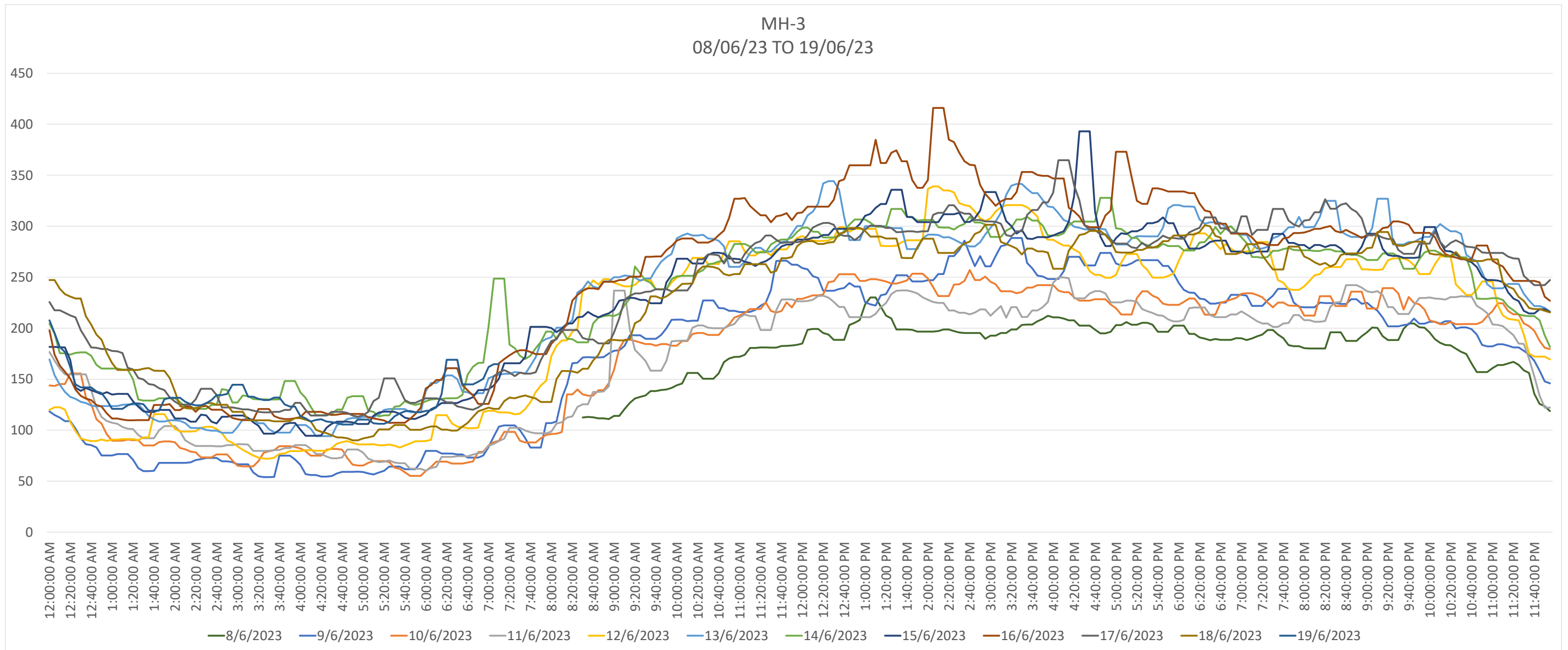
SEG COS MH3 Period Summary: Level				
Measures	Value	Unit	Date	Time
Max.	2.77	in	Friday, June 16, 2023	2:05 PM
Min.	1.03	in	Friday, June 9, 2023	3:25 AM
Avg.	1.94	in		

SEG COS MH3 Period Summary: Velocity				
Measures	Value	Unit	Date	Time
Max.	5.37	fps	Friday, June 16, 2023	2:05 PM
Min.	2.91	fps	Saturday, June 10, 2023	5:45 AM
Avg.	4.31	fps		

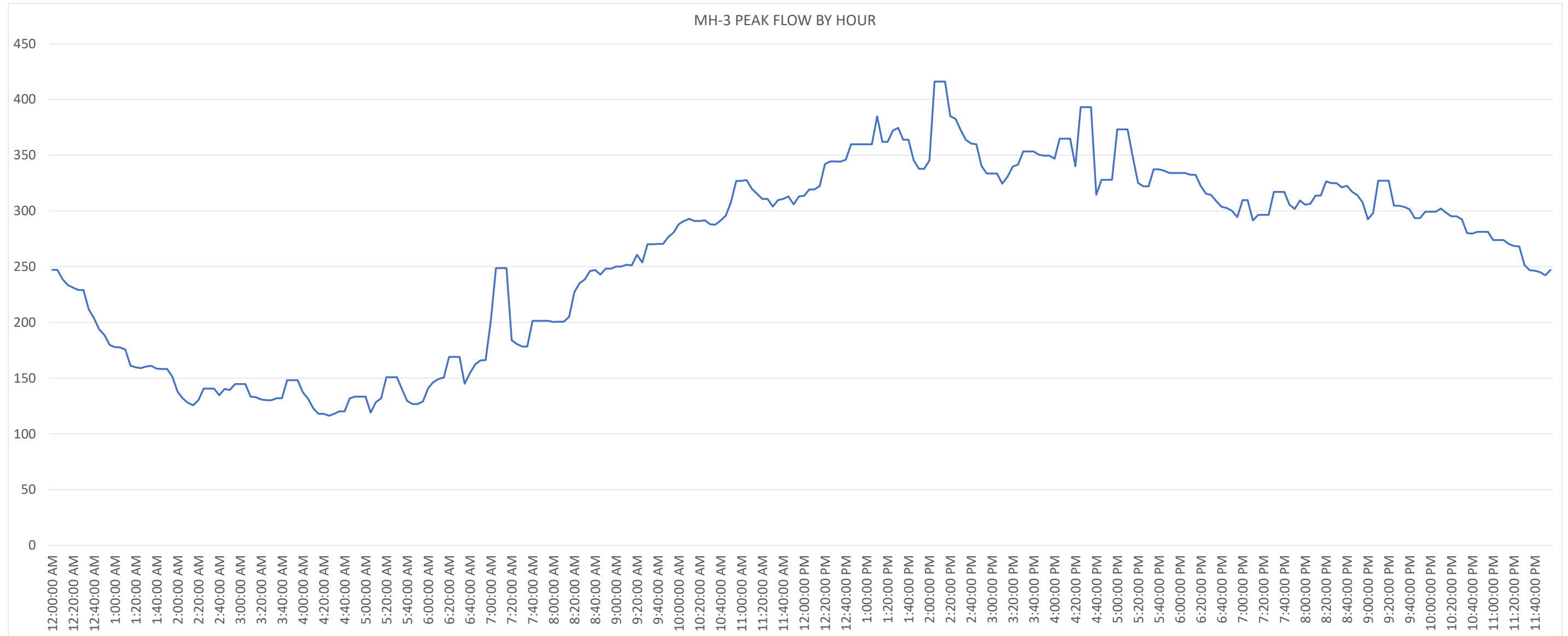
*Data begins at 8:30 am on June 8th and ends at 7:10 am on June 19th.

FLOW STUDY FOR PARK VILLAGE - SCOTTSDALE

MH-3
08/06/23 TO 19/06/23



FLOW STUDY FOR PARK VILLAGE - SCOTTSDALE





SL1500 RDH Flow Study for SEG

Doug Mann

SEG

5240 N. 16th St., Suite 105, Phoenix, AZ 85016

SL1500 RDH Flow Study, 3 sites total in Scottsdale, AZ from Thursday 06-08-23 to Monday 06-19-23.

Equipment for Site: Hach 901 Logger with Flo-Dar Sensor (Area Velocity).

The equipment was installed on Friday, 06/08/23 with confined space entry, pipe size confirmed, sensor calibrated, and level depth confirmed to the flow level.

Duration of monitoring: 10-days including 2 weekends

Monitor: Flow (gpm), Level (in), and Velocity (fps)

Data logging: 5-minute intervals (No averaged intervals)

Calibration Performed: Calibration method using 15.00-inch target.

Target Measure: 15.00 in Meter Read: 14.99 in 6/08/2023 09:20 am

Meter Validation: PASSED

Location #4 located on N. Scottsdale Rd East of E. Berneil Dr.

72" Diameter, Rim to Invert: 175.00 inches

24" VCP pipe, flowing South

One 8" lateral pipe from the West.

The pipe condition is intact and reasonably clean.

Scum line of 5.50 inches

Flo-Dar installed pointing upstream in the 24" pipe channel.

Flow Data is valid having no missing, erroneous, or anomalies with data.

Attached is a MS Excel summary showing level, velocity, and flow logged at 5-minute intervals during the monitoring period.

RDH Environmental Services

Jeff Schulte

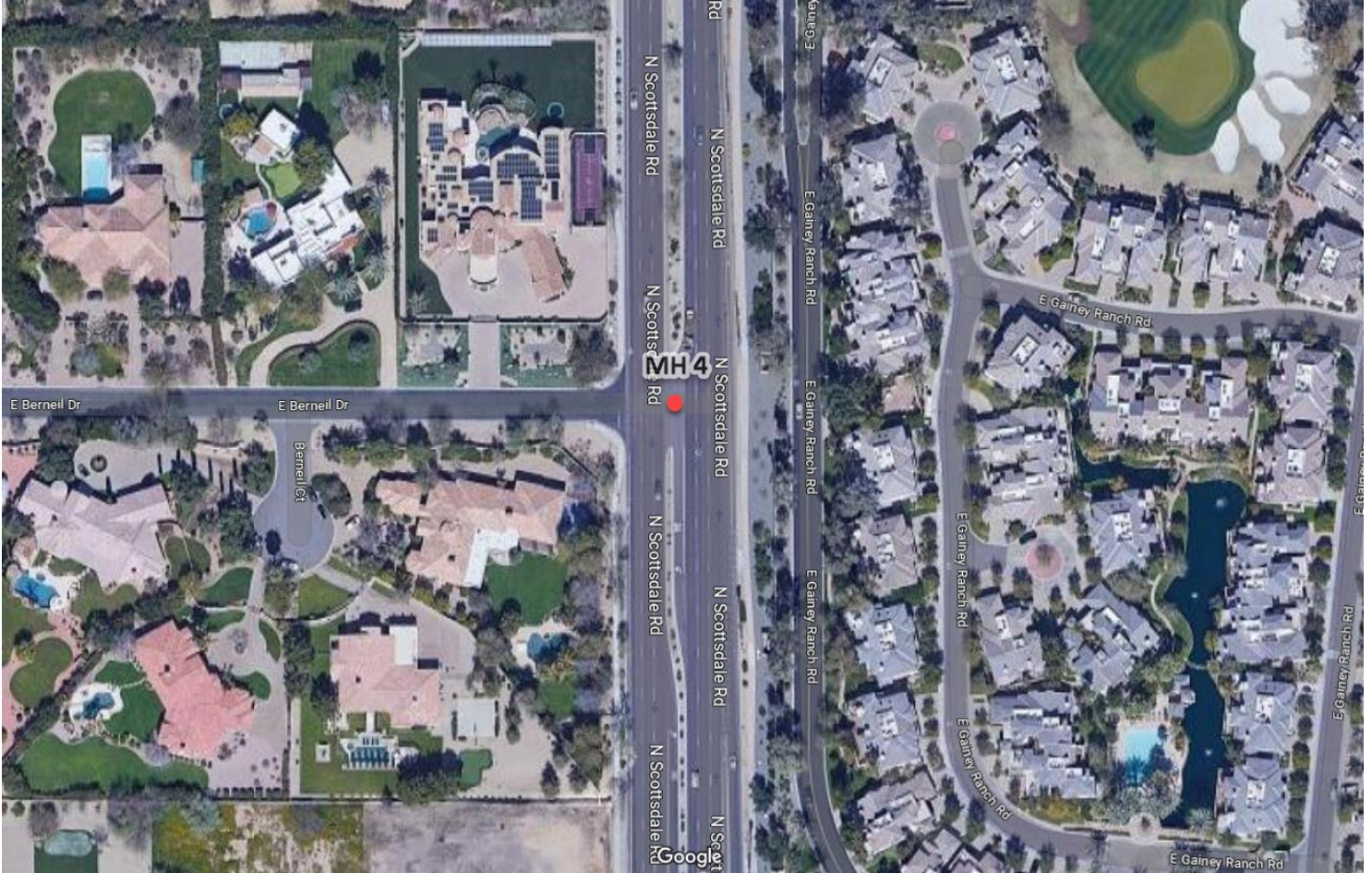
Operations Manager

servicemanager@rdh-env.com

APPENDIX II

SL1500 RDH Flow Study for SEG

Site Map:



SL1500 RDH Flow Study for SEG

Pictures:





SL1500 RDH Flow Study for SEG

Period Summaries:

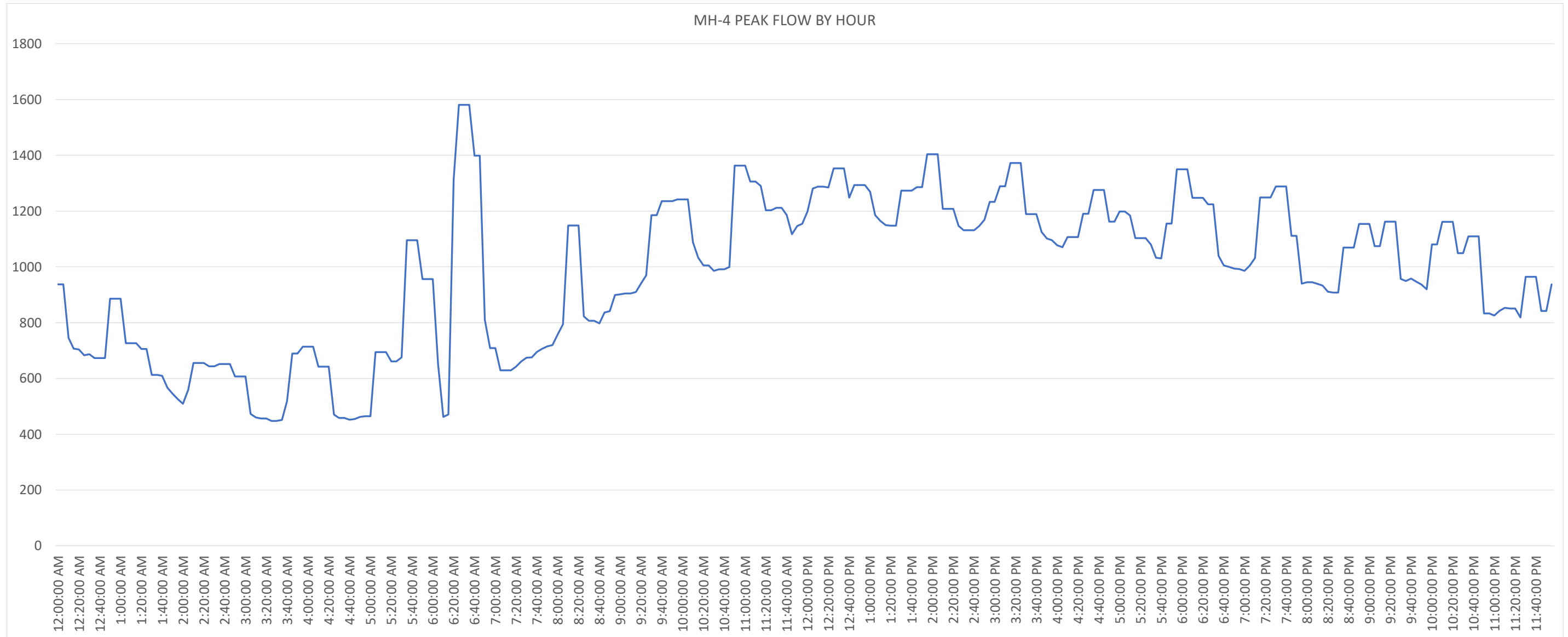
SEG COS MH4 Period Summary: Flow				
Measures	Value	Unit	Date	Time
Max.	1581.38	gpm	Tuesday, June 13, 2023	6:25 AM
Min.	357.57	gpm	Friday, June 9, 2023	5:25 AM
Avg.	793.81	gpm		
Total	12,502,585.91	gal		

SEG COS MH4 Period Summary: Level				
Measures	Value	Unit	Date	Time
Max.	6.48	in	Tuesday, June 13, 2023	6:25 AM
Min.	2.99	in	Friday, June 9, 2023	5:25 AM
Avg.	4.45	in		

SEG COS MH4 Period Summary: Velocity				
Measures	Value	Unit	Date	Time
Max.	5.15	fps	Tuesday, June 13, 2023	6:25 AM
Min.	3.32	fps	Thursday, June 8, 2023	9:35 AM
Avg.	4.29	fps		

*Data begins at 9:35 am on June 8th and ends at 8:05 am on June 19th.

FLOW STUDY FOR PARK VILLAGE - SCOTTSDALE





SL1500 RDH Flow Study for SEG

Doug Mann

SEG

5240 N. 16th St., Suite 105, Phoenix, AZ 85016

SL1500 RDH Flow Study, 3 sites total in Scottsdale, AZ from Thursday 06-08-23 to Monday 06-19-23.

Equipment for Site: Hach 901 Logger with Flo-Dar Sensor (Area Velocity).

This site is a HACH DDS site for the City of Scottsdale that already has HACH Flow Monitoring Equipment installed.

Duration of monitoring: 10-days including 2 weekends

Monitor: Flow (gpm), Level (in), and Velocity (fps)

Data logging: 15-minute intervals (No averaged intervals)

Calibration Performed: No calibration Performed due to this being a DDS site.

Location #5 located in parking lot entrance of ROLFS Hair Salon

75" Diameter, Rim to Invert: 200.00 inches

42" VCP pipe, flowing South

No Lateral(s)

The pipe condition is intact and reasonably clean.

Flo-Dar installed pointing upstream in the 42" pipe channel.

Flow Data is valid having no missing, erroneous, or anomalies with data.

Attached is a MS Excel summary showing level, velocity, and flow logged at 5-minute intervals during the monitoring period.

RDH Environmental Services

Jeff Schulte

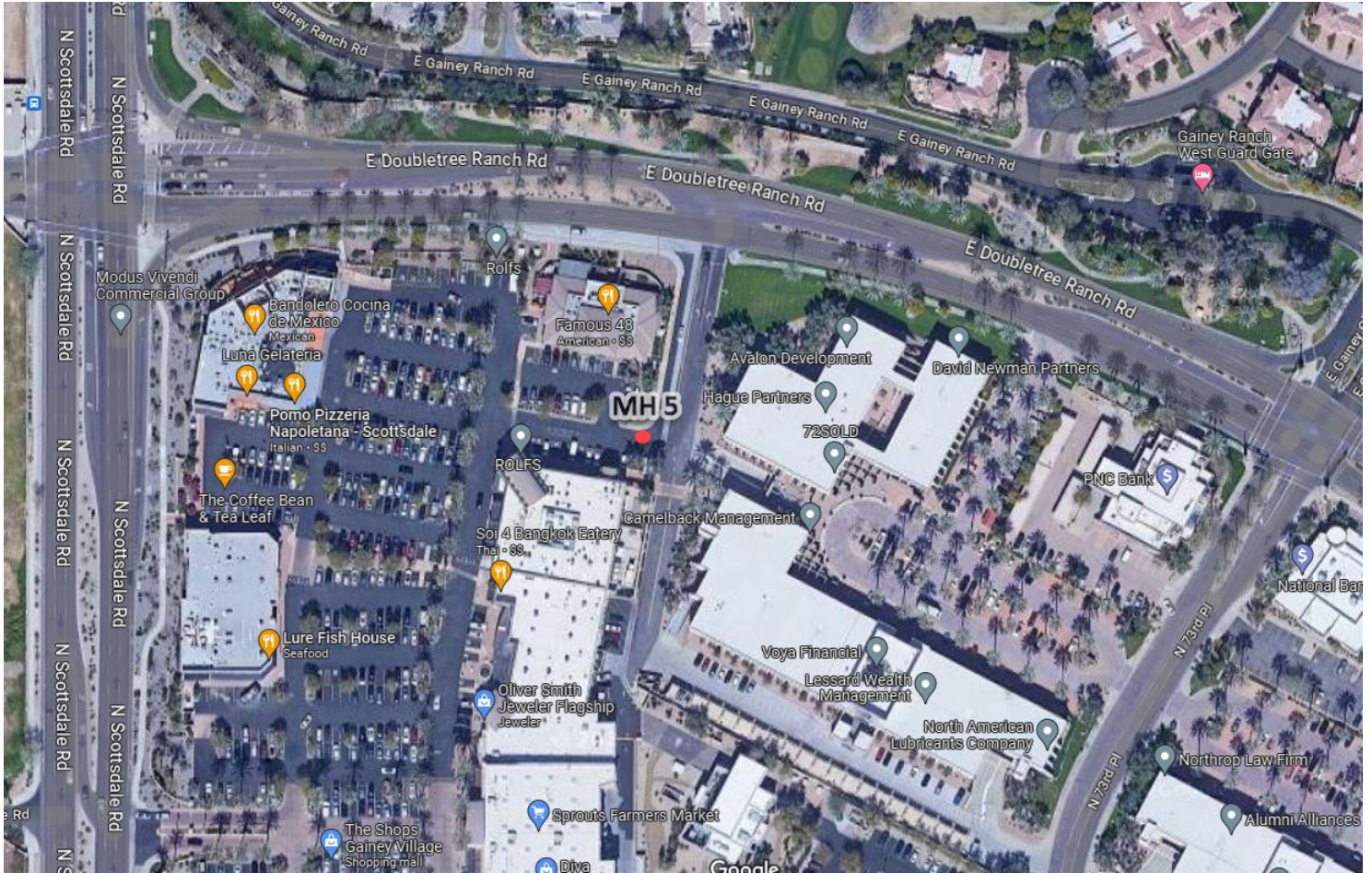
Operations Manager

servicemanager@rdh-env.com

APPENDIX II

SL1500 RDH Flow Study for SEG

Site Map:



SL1500 RDH Flow Study for SEG

Pictures:





SL1500 RDH Flow Study for SEG

Period Summaries:

SEG COS MH5 Period Summary: Flow				
Measures	Value	Unit	Date	Time
Max.	6735.64	gpm	Sunday, June 18, 2023	1:45 PM
Min.	2317.13	gpm	Wednesday, June 14, 2023	6:30 AM
Avg.	4472.90	gpm		
Total	73,266,162.95	gal		

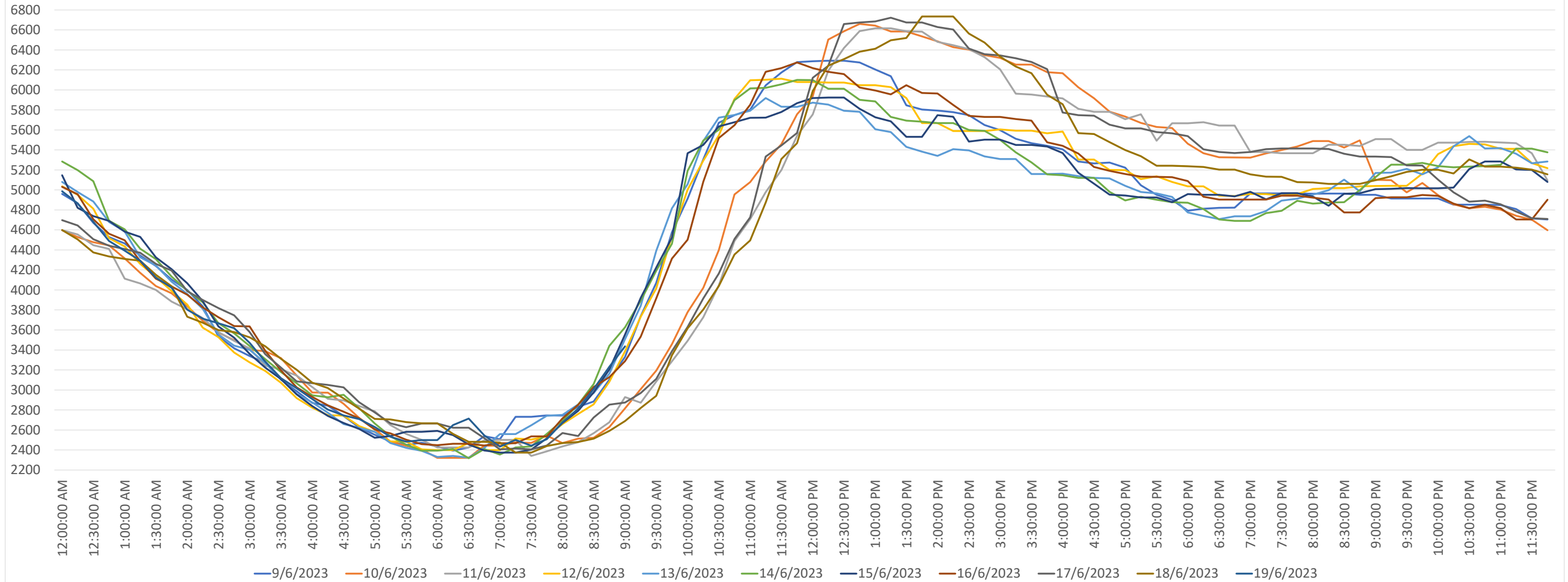
SEG COS MH5 Period Summary: Level				
Measures	Value	Unit	Date	Time
Max.	36.09	in	Sunday, June 18, 2023	1:45 PM
Min.	14.12	in	Thursday, June 8, 2023	6:15 AM
Avg.	29.49	in		

SEG COS MH5 Period Summary: Velocity				
Measures	Value	Unit	Date	Time
Max.	2.09	fps	Thursday, June 8, 2023	9:15 AM
Min.	1.13	fps	Tuesday, June 13, 2023	3:15 AM
Avg.	1.39	fps		

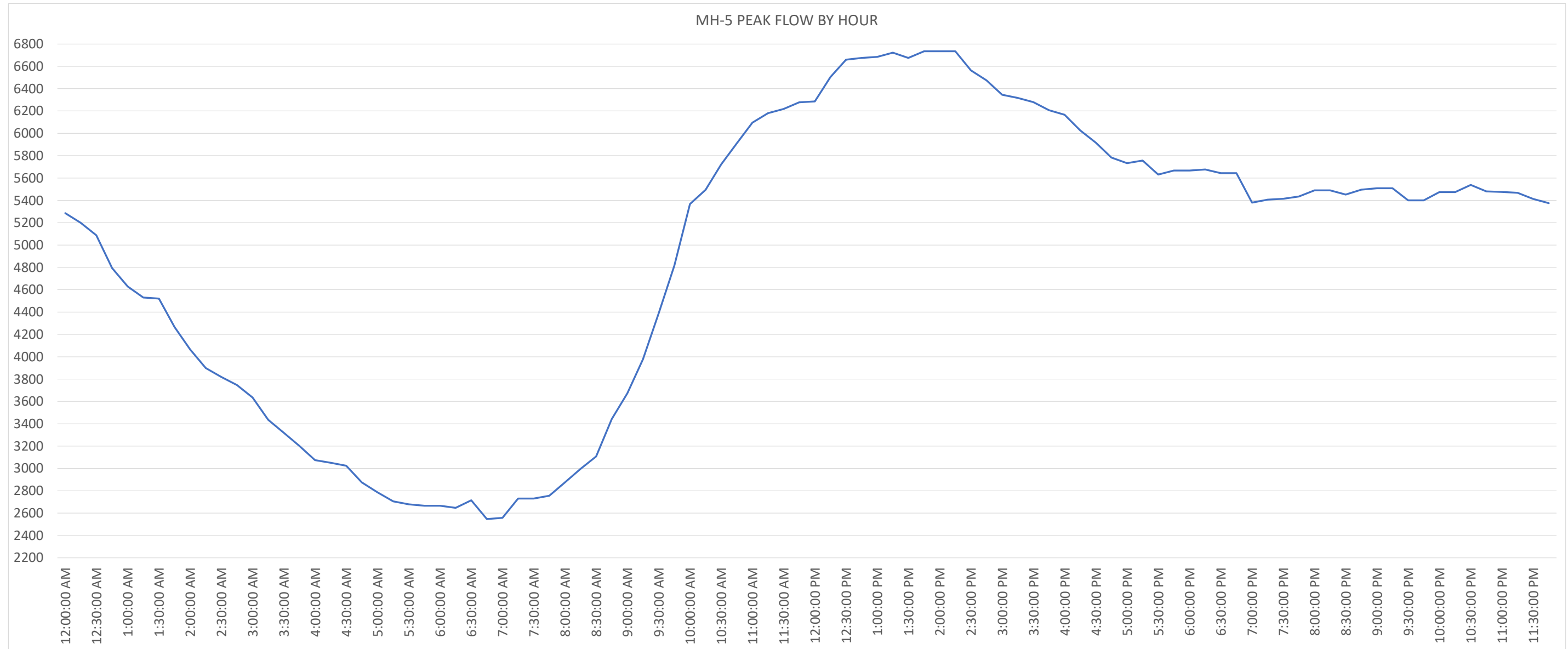
*Data begins at 12:00 am on June 8th and ends at 9:00 am on June 19th.

FLOW STUDY FOR PARK VILLAGE - SCOTTSDALE

MH-5
08/06/23 TO 19/06/23



FLOW STUDY FOR PARK VILLAGE - SCOTTSDALE



New Onsite Sewers

8" Sewer S=0.0052' d/D=0.65		
Project Description		
Friction Method	Manning Formula	
Solve For	Discharge	
Input Data		
Roughness Coefficient	0.013	
Channel Slope	0.00520	ft/ft
Normal Depth	5.20	in
Diameter	8.0	in
Results		
Discharge	295.8	gpm
Flow Area	0.24	ft²
Wetted Perimeter	1.25	ft
Hydraulic Radius	2.31	in
Top Width	7.6	in
Critical Depth	4.59	in
Percent Full	65.0	%
Critical Slope	0.00757	ft/ft
Velocity	2.74	ft/s
Velocity Head	0.12	ft
Specific Energy	0.55	ft
Froude Number	0.79	
Maximum Discharge	420.7	gpm
Discharge Full	391.1	gal/min
Slope Full	0.00298	ft/ft
Flow Type	SubCritical	

APPENDIX III – Onsite Sewer Hydraulic Calculations

12" Sewer S=0.0052 d/D=0.65

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013
Channel Slope	0.00520 ft/ft
Normal Depth	7.80 in
Diameter	12.0 in

Results

Discharge	872.2 gpm
Flow Area	0.54 ft ²
Wetted Perimeter	1.88 ft
Hydraulic Radius	3.46 in
Top Width	11.4 in
Critical Depth	7.13 in
Percent Full	65.0 %
Critical Slope	0.00678 ft/ft
Velocity	3.60 ft/s
Velocity Head	0.20 ft
Specific Energy	0.85 ft
Froude Number	0.84
Maximum Discharge	1240.4 gpm
Discharge Full	1153.1 gal/min
Slope Full	0.00298 ft/ft
Flow Type	SubCritical

APPENDIX III – Onsite Sewer Hydraulic Calculations

6" Stormwaer Pressure Sewer

Project Description

Friction Method	Hazen-Williams Formula
Solve For	Pressure at 1

Input Data

Pressure 2	0.00	psi
Elevation 1	1482.00	ft
Elevation 2	1484.00	ft
Length	660.00	ft
Roughness Coefficient	130.000	
Diameter	6.0	in
Discharge	932.0	gpm

Results

Pressure 1	19.50	psi
Headloss	42.98	ft
Energy Grade 1	1528.71	ft
Energy Grade 2	1485.74	ft
Hydraulic Grade 1	1526.98	ft
Hydraulic Grade 2	1484.00	ft
Flow Area	0.20	ft ²
Wetted Perimeter	1.57	ft
Velocity	10.58	ft/s
Velocity Head	1.74	ft
Friction Slope	0.06512	ft/ft

APPENDIX III – Onsite Sewer Hydraulic Calculations

EVALUATE IMPACT OF 100-YR STORM RELEASED INTO THE SANITARY SEWER SYSTEM OVER 36-HOUR PERIOD

PRECIPITATION DATA FROM
STATION
DATA FROM

NOAA-CLIMATE DATA ONLINE
SCOTTSDALE MUNICIPAL AIRPORT, AZ US USW00003192
JAN 2022 TO NOV 2022 (DEC CALCULATED WITH AVERAGE)

Required Storage Volume Calculations					
					$V_r = 1 * (P/12) * C_w * A$ P=100-yr, 2-hr= 2.25in.
Drainage Area ID	Area (acres)	CW (-)	Depth (in)	Volume Req. (acre-ft)	Volume Req. (CF)
Pre vs Post	20.64	0.12	2.250	0.464	20,229.26
Additional Area	7.08	0.85	2.250	1.128	49,152.02
Existing Volume					154,877
Total Req Volume					224,258.3

Average Monthly Rainfall

Month	Precip. per Month (in)	Park Village - Total Rainfall per Month (gal)
Jan	0.13	88,068
Feb	0.44	298,075
March	0.19	128,714
April	0.00	0
May	0.00	0
June	0.18	121,940
July	0.84	569,053
Aug	3.78	2,560,739
Sept	0.00	0
Oct	0.70	474,211
Nov	0.31	210,008
Dec	0.60	406,467

Total (gal) 4,857,275

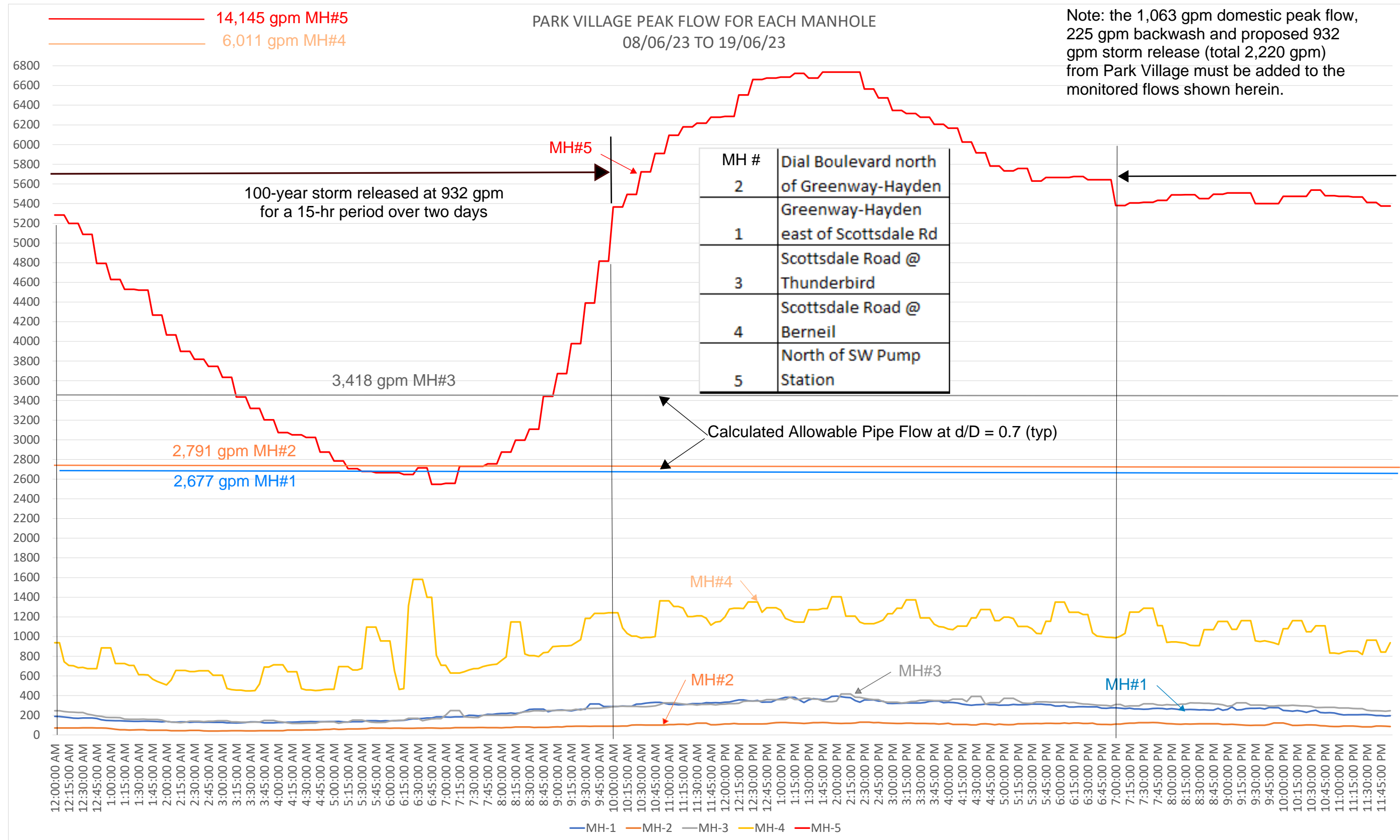
100-Year Rainfall Dissipation Scenarios

Total Storage Volume (gal)	Dissipated over 24 hrs (gpm)	Dissipated over 30 hrs (gpm)	Dissipated over 36 hrs (gpm)
1,677,450	2329	1864	777

Note: 1864 gpm is 932 gpm over two 15-hr periods

APPENDIX IV -100-yr Rainfall Event at Park Village

COMBINED DATA FOR OFF-SITE WASTEWATER SYSTEM DAILY FLOW



Note: calculations based on COS Q-S for reach of pipe indicating minimum slope.

**Monitored Manhole #2 – note monitored pipe diameter was 10" VCP
New 18" Dial Boulevard Pipe – Park Village to Greenway Hayden**

18" pipe at d/D=0.70		
Project Description		
Friction Method	Manning Formula	
Solve For	Discharge	
Input Data		
Roughness Coefficient	0.013	
Channel Slope	0.00500	ft/ft
Normal Depth	12.60	in
Diameter	18.0	in
Results		
Discharge	2791.0	gpm
Flow Area	1.32	ft²
Wetted Perimeter	2.97	ft
Hydraulic Radius	5.33	in
Top Width	16.5	in
Critical Depth	11.57	in
Percent Full	70.0	%
Critical Slope	0.00633	ft/ft
Velocity	4.71	ft/s
Velocity Head	0.34	ft
Specific Energy	1.39	ft
Froude Number	0.85	
Maximum Discharge	3586.0	gpm
Discharge Full	3333.6	gal/min
Slope Full	0.00350	ft/ft
Flow Type	SubCritical	

APPENDIX VI – Offsite Pipe Hydraulics

Monitored Manhole #1

Existing Greenway-Hayden Pipe - Dial Boulevard to Scottsdale Road

18" pipe at d/D=0.7

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013
Channel Slope	0.00460 ft/ft
Normal Depth	12.60 in
Diameter	18.0 in

Results

Discharge	2677.0 gpm
Flow Area	1.32 ft ²
Wetted Perimeter	2.97 ft
Hydraulic Radius	5.33 in
Top Width	16.5 in
Critical Depth	11.32 in
Percent Full	70.0 %
Critical Slope	0.00620 ft/ft
Velocity	4.51 ft/s
Velocity Head	0.32 ft
Specific Energy	1.37 ft
Froude Number	0.81
Maximum Discharge	3439.5 gpm
Discharge Full	3197.5 gal/min
Slope Full	0.00322 ft/ft
Flow Type	SubCritical

APPENDIX VI – Offsite Pipe Hydraulics

Monitored MH #3 at Thunderbird

Existing Scottsdale Road Pipe – Greenway-Hayden to Thunderbird

18" pipe at d/D=0.70

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00750	ft/ft
Normal Depth	12.60	in
Diameter	18.0	in

Results

Discharge	3418.3	gpm
Flow Area	1.32	ft ²
Wetted Perimeter	2.97	ft
Hydraulic Radius	5.33	in
Top Width	16.5	in
Critical Depth	12.83	in
Percent Full	70.0	%
Critical Slope	0.00716	ft/ft
Velocity	5.76	ft/s
Velocity Head	0.52	ft
Specific Energy	1.57	ft
Froude Number	1.04	
Maximum Discharge	4391.9	gpm
Discharge Full	4082.8	gal/min
Slope Full	0.00526	ft/ft
Flow Type	SuperCritical	

APPENDIX VI – Offsite Pipe Hydraulics

Monitored Manhole #4 at Berneil

Existing Scottsdale Road Pipe – Thunderbird to Doubletree

24" pipe at d/D=0.70

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00500	ft/ft
Normal Depth	16.80	in
Diameter	24.0	in

Results

Discharge	6010.8	gpm
Flow Area	2.35	ft²
Wetted Perimeter	3.96	ft
Hydraulic Radius	7.11	in
Top Width	22.0	in
Critical Depth	15.81	in
Percent Full	70.0	%
Critical Slope	0.00590	ft/ft
Velocity	5.70	ft/s
Velocity Head	0.51	ft
Specific Energy	1.91	ft
Froude Number	0.89	
Maximum Discharge	7722.8	gpm
Discharge Full	7179.3	gal/min
Slope Full	0.00350	ft/ft
Flow Type	SubCritical	

APPENDIX VI – Offsite Pipe Hydraulics

Manhole #5 near Southwest Pump Station

Existing Pipe from Scottsdale Road to Southwest Pump Station

42" pipe at d/D=0.7

Project Description

Friction Method	Manning Formula
Solve For	Discharge

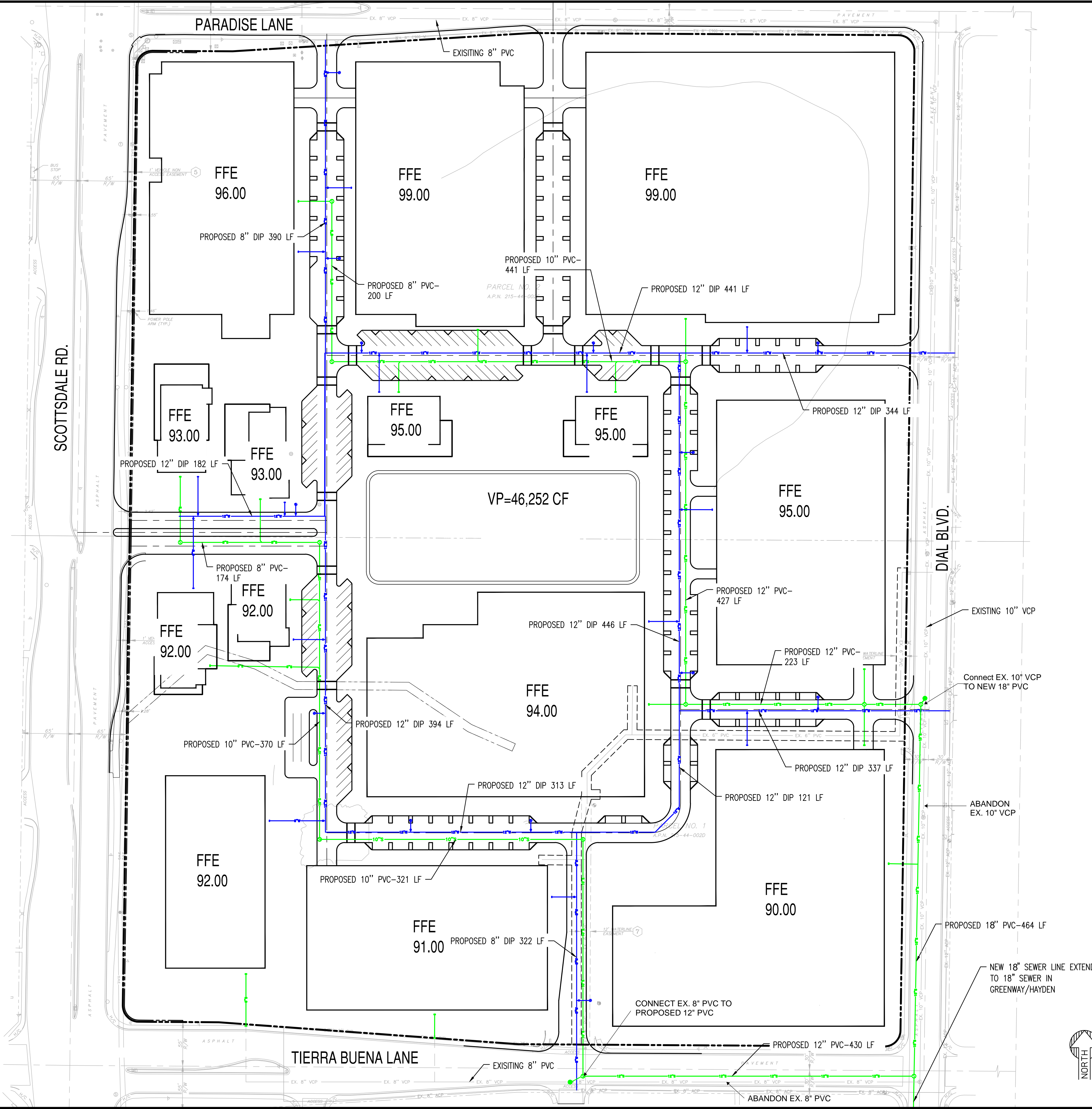
Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00140	ft/ft
Normal Depth	29.40	in
Diameter	42.0	in

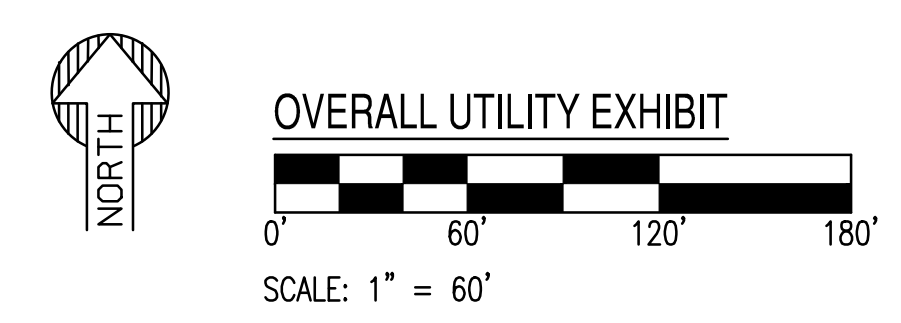
Results

Discharge	14145.3	gpm
Flow Area	7.19	ft²
Wetted Perimeter	6.94	ft
Hydraulic Radius	12.44	in
Top Width	38.5	in
Critical Depth	20.84	in
Percent Full	70.0	%
Critical Slope	0.00403	ft/ft
Velocity	4.38	ft/s
Velocity Head	0.30	ft
Specific Energy	2.75	ft
Froude Number	0.52	
Maximum Discharge	18174.3	gpm
Discharge Full	16895.2	gal/min
Slope Full	0.00098	ft/ft
Flow Type	SubCritical	

APPENDIX VI – Offsite Pipe Hydraulics



APPENDIX VII



PRELIMINARY
NOT FOR
CONSTRUCTION

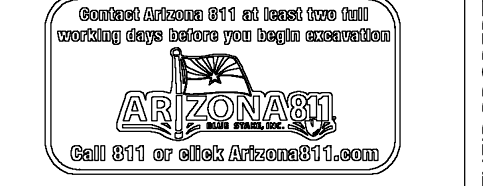
SUSTAINABILITY
ENGINEERING
GROUP

SEG

8380 E. GELDING DRIVE SUITE 101, SCOTTSDALE, ARIZONA 85260
WWW.AZSEG.COM TEL. 480.586.7226 FAX. 480.259.3534

**NELSEN
PARTNERS**

ARCHITECTS & PLANNERS



PROJECT: PARK VILLAGE

LOCATION: 16001 N. SCOTTSDALE ROAD, SCOTTSDALE, ARIZONA 85254

DRAWN	JC	08/12/2022
DESIGNED	JC	08/12/2022
QC		
FINAL QC		
PROJ. MGR.	AF	08/12/2022
DATE:	08/12/2022	
ISSUED FOR:	REVIEW	

REVISION NO.:	DATE:
JOB NO.:	211005
SHEET TITLE:	OVERALL UTILITY EXHIBIT
PAGE NO.:	1 OF 1

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PRELIMINARY
NOT FOR
CONSTRUCTION
OR
RECORDING

**THE PARQUE
PCP APPLICATION**
16001 N SCOTTSDALE RD
SCOTTSDALE, AZ, 85254

PRE-APP # 620-PA-2022 ZONING # 000-00-0000 DRB # 000-00-0000

Date
01/27/2023

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Project No.
21018

A114
PHASING
PLAN

APPENDIX VIII

LEGEND



PHASE 1



FUTURE PHASES

NOTES:

1. PHASE 1 WILL BE BUILT IN TANDEM WITH ONE OR MORE OF THE FUTURE PHASES



NORTH

01 PHASING PLAN

SCALE: 1"=60'



REF:

APPENDIX IX – Water Management Principles

Re: Smart Infrastructure and Sustainability Opportunities

Water/Sewer Infrastructure

- Advanced metering infrastructure combined with remote meter data management technology will provide real-time reading of usage and identification of and leakage.
- Manhole flow monitoring will permit comparison of water usage vs. sewer discharge during average day and peak demand periods.
- Centralized onsite technology equipment will permit the property management association hands-on analysis of usage from the onsite meters.
- Private submetering options are available for residential buildings.

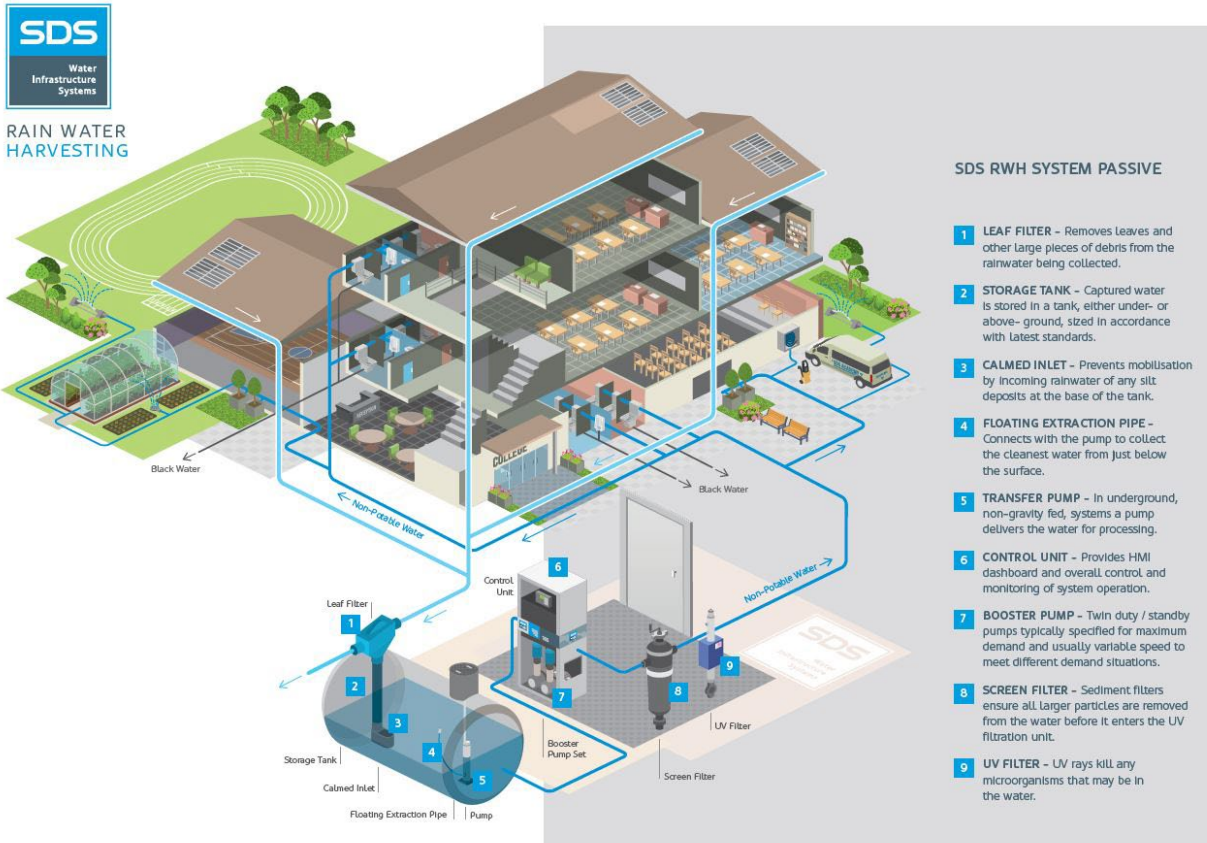
Storm Runoff - Recharge vs Retention and Recycling for Parque

- 28 acres of land that averages 10 inches of rain per year with an 85% capture rate equals approximately 20 acre-feet of runoff.
- 1 acre-foot of runoff will provide 2 single family residences with water per year, or 4 units per year for high density residential.
- Recharging 20 acre-feet would provide sufficient water for approximately 80 high density residential units.
- Permitting for recharge has many risks. No evidence of a recharge permit being filed with the State for this small amount of water.
- The City of Scottsdale has two wells within ½ mile of the Parque site. The groundwater is about 300 to 400 feet deep with the wells drilled to 1700 feet. Typical drywells will not pollute the water table and ADEQ only requires 10-foot vertical separation.
- Recommendation is to pursue green building practices through standard retention and reuse; avoid any recharge permitting processes.

Onsite green building practices can include:

- Utilize plumbing fixtures with higher efficiency than specified in the codes.
- Utilize rainwater capture from rooftops and implement roof top planting/gardens.
- Install permeable open graded pavement.
- Utilize recharge swales and basins that can utilize granular beds to improve storage and percolation. Soils testing is needed to verify percolation rates.
- Utilize dry wells for stormwater dissipation with first flush filtration chambers.

Typical Rainwater Recycle System Concept (From SDS Water Infrastructure Systems)



Summary of Water/Sewer Usage and Net Water Use

The *Scottsdale Sustainable Water Management Principles* includes a *Water and Land Use Management* section outlining the requirements of a “Water Demand Exhibit” for any property that submits a General Plan Amendment and estimates metered water uses greater than 100,000 gallons per day.

The estimated water use, wastewater use and net water use are shown in the following Water Demand Exhibit. Calculations are based on the demands in the City’s *Design Standards and Policies Manual*. Implementing sustainable practices could potentially reduce this demand 20 to 40%. The University of Arizona Water Resources Research Center reports a study in Tucson found that greywater can account for 27% of a total residential demand.

INSTRUCTIONS

INPUT DEVELOPMENT NAME, CASE NUMBER, AND QUANTITY VALUES TO DETERMINE TOTAL AVERAGE DAILY WATER USE PER THE 2018 DESIGN STANDARDS AND POLICY MANUAL (DS7PM) CHAPTER 6 USING GALLONS PER DAY (GPD) VALUES FROM FIGURE 6-1.2

TABLE 1: QUANTITY INPUT TABLE FOR THE DEVELOPMENT					
ENTER DEVELOPMENT NAME & CITY REVIEW CASE NUMBER HERE					
WATER USE DEVELOPMENT TYPE/CATEGORY	AVERAGE UNIT WATER USE PER DS&PM CH. 6 (GPD/UNIT)	INPUT APPLICABLE QUANTITY FOR DEVELOPMENT IN THIS COLUMN	NUMERICAL UNIT	TOTAL AVERAGE WATER USE (GPD)	NOTES
Category: Residential/ Commerical Residential/ Hotel					
< 2 DU/ac	485.6		DU	-	Community pool demands not included here. Refer to separate category.
2 – 2.9 DU/ac	470.4		DU	-	
3 – 7.9 DU/ac	248.2		DU	-	
8 – 11.9 DU/ac	227.6		DU	-	
12 – 22 DU/ac	227.6		DU	-	
High Density Condominium (condo)	185.3	1,236	DU	229,031	
Resort Hotel	446.3	223	ROOM	99,525	Includes site amenities such as 1 "standard" restaurant w/ associated dedicated kitchen, laundry service, landscaping, fountains, and 1 medium capacity pool. Large event venues/kitchens or multiple/large pools and multiple restaurants are not included.
Category: Commerical/ Other					
Restaurant	1.3	34,800	FT2	45,240	
Commercial/Retail	0.80	-	FT2	-	
Commerical High Rise	0.60	100,000	FT2	60,000	per IBC highrise is at or over 75 feet to highest finished floor
Office	0.60		FT2	-	
Institutional	1,340		ACRE	-	
Industrial	1,027		ACRE	-	
Research and Development	1,284		ACRE	-	
Category: Special Use Areas					
Natural Area Open Space	-		ACRE	-	Zero water demand
Developed Open Space - Parks	1,786	2	ACRE	3,572	
Developed Open Space- Golf Course	4,285		ACRE	-	
Category: Evaporation from Swimming Pools/Spas, Cooling, Turf Area Irrigation, Other Outdoor Consumptive Uses					
Extra large pool (60k to 100k gallons)	274		EA	-	Annual mean ETo = 74.75 in as collected by AZ Met. Kc = 1.1. Average pool size of 400 sq. ft. loses 20,490 gallons per year, or 51.23 gallons per sq ft, not including backwashing or leaks, per AMWUA calculator.
Large pool (above 30k to 60k gallons)	154	3	EA	462	
Medium pool (15k to 30k gallons)	75	3	EA	226	
Small pool or spa (under 15k gallons)	51		EA	-	
Total Bermuda Turf Area	0.10		FT2	-	1 sq ft of non-overseeded turf at 60% efficiency with increased Kc is 35 gallons per sq ft per year, per AMWUA calculator.
Total Overseeded Turf Area	0.02		FT2	-	1 sq ft of overseeded turf at 60% efficiency with increased Kc is 9 gallons per sq ft per year, per AMWUA calculator.
Evaporative Cooling/ Cooling Towers	-		TOTAL COOLING TONNAGE	-	Based on 1.50 cycles of concentration and average annual daily utilization of 68%. Water use is linear with respect to total cooling capacity tonnage. Based on US Dept of Energy Efficiency and Renewable Energy data.
Category: Filter Backwash Flows & Make-up Water from Pools & Spas (rapid sand filters)					
Extra large pool (60k to 100k gallons)	229	-	EA	-	Based on once per 7 day backwash @ 50,100, and 150gpm, respectively for each size pool category for 8 minute duration. Quantity values used from pool input values above.
Large pool (above 30k to 60k gallons)	171	3	EA	514	
Medium pool (15k to 30k gallons)	114	3	EA	343	
Small pool or spa (under 15k gallons)	57	-	EA	-	
A. TOTAL AVERAGE DAILY WATER USE FOR THIS DEVELOPMENT				438,913	GPD
NOTES:					
GPD=GALLONS PER DAY, DU=DWELLING UNITS, FT2=SQUARE FEET, AC=ACRE, EA=EACH UNIT, ETO=EVAPOTRANSPIRATION, Kc=CROP COEFFICIENT, AZMET=ARIZONA METEOROLOGICAL NETWORK, AMWUA=ARIZONA MUNICIPAL WATER USERS ASSOCIATION					
NONE OF THE VALUES OR CALCULATIONS HEREIN ARE INTENDED TO BE USED FOR INFRASTRUCTURE DESIGN, PEAK FLOW DETERMINATION, OR SYSTEM CAPACITY ANALYSIS. FOR THESE PURPOSES REFER TO CH.6 & 7 OF THE CITY'S DESIGN STANDARDS AND POLICY MANUAL FOR THE RESPECTIVE DESIGN VALUES AND PEAKING FACTORS.					
TABLE INPUT VALUES LAST UPDATED:				8/10/2023	

INSTRUCTIONS

IDENTIFY WATER CONSERVATION MEASURES ABOVE THOSE REQUIRED BY CITY CODE THAT THE DEVELOPMENT(S) PROPOSE TO IMPLEMENT. ENTER AN "X" FOR EACH PROPOSED MEASURE.

TABLE 2: APPROVED SUPPLEMENTAL WATER CONSERVATION MEASURES		
FILL IN DEVELOPMENT NAME AND CITY CASE NUMBER ON TAB 1		
PROPOSED FOR THIS DEVELOPMENT (ENTER "X")	MEASURE	DESCRIPTION
X	1. Submetering	Multi-family and mixed-use developments SUBMETER UNITS for leak detection and for occupants ability to manage their own water use
	2. No outdoor water features	Decorative water features outdoors can be a source of water use that is not functional
X	3. Indoor water features submetered	Water features have proven to be a source of leaks. Submetering that is capable of alerts to the building monitoring system greatly reduce water waste
X	4. Limitation on functional turf grass	Functional grass turf are areas used for congregation of large number of people and should be limited to up to 10% of the landscapable area
	5. Limitations on artificial turf	Artificial turf is a large source of heat especially during summer months.
X	6. Landscaped Rainwater harvesting	Earthworks, such as berms and basins, are encouraged to promote passive rainwater harvesting for planned plants and trees
X	7. Cooling tower controllers with monitoring technology	Arizona high evapotranspiration rates, cooling towers use significantly more water here than in other states. Monitory systems can optimize this water use.
X	8. Pools and splashpads submeters with monitoring technology	Pools and splashpad can be a source of leaks. Submetering that is capable of alerts to the building monitoring system greatly reduce water waste. Timers on Splash pads
<p>NOTES: Greywater systems and large areas of artificial turf are not recommended by water conservation. This list represents water conservation measures that the conservation office has approved and has shown to provide proven water savings.</p>		
TABLE INPUT VALUES LAST UPDATED:		8/10/2023

Water Demand Exhibit Summary

FILL IN DEVELOPMENT NAME AND CITY CASE NUMBER ON TAB 1

1. Total Estimated Water Use per Day on a Sustainable Basis (gallons per day, gpd)

438,913

gpd

2. Net Water (NW) / Consumptive Use (gallons per day, gpd)

100,304

gpd

3. Proposed Water Conservation Measures Above Those Required By City Code

X	1. Submetering	Multi-family and mixed-use developments SUBMETER UNITS for leak detection and for occupants ability to manage their own water use
	2. No outdoor water features	NOT PROPOSED
X	3. Indoor water features submetered	Water features have proven to be a source of leaks. Submetering that is capable of alerts to the building monitoring system greatly reduce water waste
X	4. Limitation on functional turf grass	Functional grass turf are areas used for congregation of large number of people and should be limited to up to 10% of the landscapable area
	5. Limitations on artificial turf	NOT PROPOSED
X	6. Landscaped Rainwater harvesting	Earthworks, such as berms and basins, are encouraged to promote passive rainwater harvesting for planned plants and trees
X	7. Cooling tower controllers with monitoring technology	Arizona high evapotranspiration rates, cooling towers use significantly more water here than in other states. Monitory systems can optimize this water use.
X	8. Pools and splashpads submeters with monitoring technology	Pools and splashpad can be a source of leaks. Submetering that is capable of alerts to the building monitoring system greatly reduce water waste. Timers on Splash pads

4. Annual Economic Value of the Development on a per Gallon of Use Basis (Applies to Commercial or Mixed Use, To be Completed by City)

1. Major City Revenues

\$/1,000 gallons

2. Total Annual Output Impact

\$/1,000 gallons

TABLE 4: WATER USE SUMMARY

FILL IN DEVELOPMENT NAME AND CITY CASE NUMBER ON TAB 1

WATER USE SUMMARY FOR THE DEVELOPMENT

USE CATEGORY	AMOUNT	UNITS	% OF TOTAL USE	CALCULATION NOTES
A. TOTAL DAILY AVERAGE WATER USE	438,913	GPD	100.0%	A=B+C, C=D+E, F=B+D
B. OUTDOOR CONSUMPTIVE USE	64,766	GPD	14.8%	
C. TOTAL INDOOR USE	374,147	GPD	85.2%	
D. INDOOR CONSUMPTIVE USE	35,537	GPD	8.1%	
E. WASTEWATER TO SEWER	338,610	GPD	77.1%	
F. TOTAL CONSUMPTIVE USE (NET USE)	100,304	GPD	22.9%	

NOTES:
 GPD=GALLONS PER DAY
 ALL VALUES ARE FOR AVERAGE WATER USE ANALYSIS ONLY. THIS CALCULATION IS NOT INTENDED TO BE USED FOR INFRASTRUCTURE DESIGN, PEAK FLOW DETERMINATION, OR SYSTEM CAPACITY ANALYSIS. FOR THESE PURPOSES REFER TO CH.6 & 7 OF THE CITY'S DESIGN STANDARDS AND POLICY MANUAL FOR THE RESPECTIVE DESIGN VALUES, PEAKING FACTORS, AND DESIGN REQUIREMENTS.

TOTAL AVERAGE WATER USE (GALLONS PER DAY, GPD)

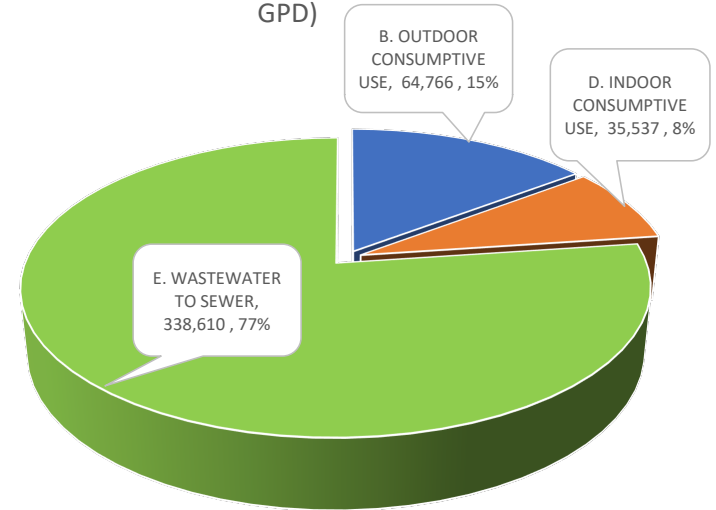


TABLE INPUT VALUES LAST UPDATED: 8/10/2023

TABLE 5: DETAILED WATER USE BREAKDOWN FOR THE DEVELOPMENT

FILL IN DEVELOPMENT NAME AND CITY CASE NUMBER ON TAB 1

TO RIGHT: WATER USE ALLOCATION --->	A. TOTAL AVERAGE WATER USE (GPD)	B. AVERAGE OUTDOOR CONSUMPTIVE WATER USE ⁽¹⁾			C. AVERAGE INDOOR TOTAL WATER USE ⁽¹⁾			D. AVERAGE INDOOR CONSUMPTIVE WATER USE ⁽²⁾			E. AVERAGE WASTEWATER FLOWS TO SEWER ⁽³⁾		
BELOW: WATER USE DEVELOPMENT TYPE/CATEGORY		UNIT OUTDOOR CONSUMPTIVE WATER USE (GPD/UNIT)	OUTDOOR CONSUMPTIVE USE (GPD)	OUTDOOR CONSUMPTIVE USE (% OF TOTAL USE)	UNIT TOTAL INDOOR WATER USE (GPD/UNIT)	INDOOR TOTAL USE (GPD)	INDOOR TOTAL USE (% OF TOTAL USE)	UNIT CONSUMPTIVE INDOOR WATER USE (GPD/UNIT)	INDOOR CONSUMPTIVE USE (GPD)	INDOOR CONSUMPTIVE USE (% OF TOTAL USE)	WASTEWATER FLOW (GPD/UNIT)	WASTEWATER FLOW (GPD)	WASTEWATER (% OF TOTAL USE)
Category: Residential/ Commercial Residential/ Hotel													
< 2 DU/ac	-	276.7	-	0.0%	208.9	-	0.0%	20.9	-	0.0%	188	-	0.0%
2 – 2.9 DU/ac	-	276.7	-	0.0%	193.7	-	0.0%	19.4	-	0.0%	174	-	0.0%
3 – 7.9 DU/ac	-	72.3	-	0.0%	175.9	-	0.0%	17.6	-	0.0%	158	-	0.0%
8 – 11.9 DU/ac	-	72.3	-	0.0%	155.3	-	0.0%	15.5	-	0.0%	140	-	0.0%
12 – 22 DU/ac	-	72.3	-	0.0%	155.3	-	0.0%	15.5	-	0.0%	140	-	0.0%
High Density Condominium (condo)	229,031	30.0	37,080	8.4%	155.3	191,950.8	43.7%	15.5	19,195.1	4.4%	140	172,756	39.4%
Resort Hotel	99,525	44.6	9,946	2.3%	401.7	89,579.1	20.4%	32.1	7,166.3	1.6%	370	82,413	18.8%
Category: Commercial/ Other													
Restaurant	45,240	0.10	3,480	0.8%	1.20	41,760.0	9.5%	0.12	4,176.0	1.0%	1.08	37,584	8.6%
Commercial/Retail	-	0.10	-	0.0%	0.70	-	0.0%	0.11	-	0.0%	0.60	-	0.0%
Commercial High Rise	60,000	0.10	10,000	2.3%	0.50	50,000.0	11.4%	0.05	5,000.0	1.1%	0.45	45,000	10.3%
Office	-	0.10	-	0.0%	0.50	-	0.0%	0.05	-	0.0%	0.45	-	0.0%
Institutional	670	-	-	0.0%	670.0	-	0.0%	100.50	-	0.0%	569.50	-	0.0%
Industrial	-	154	-	0.0%	873.0	-	0.0%	130.95	-	0.0%	742.05	-	0.0%
Research and Development	-	192	-	0.0%	1,092.0	-	0.0%	163.80	-	0.0%	928.20	-	0.0%
Category: Special Use Areas													
Natural Area Open Space	-	-	-	0.0%	-	-	-	-	-	-	-	-	0.0%
Developed Open Space - Parks	3,572	1,786	3,572	0.8%	-	-	-	-	-	-	-	-	0.0%
Developed Open Space- Golf Course	-	4,285	-	0.0%	-	-	-	-	-	-	-	-	0.0%
Category: Evaporation from Swimming Pools/Spas, Cooling, Turf Area Irrigation, Other Outdoor Consumptive Uses													
Extra large pool (60k to 100k gallons)	-	274	-	0.0%	-	-	-	-	-	-	-	-	0.0%
Large pool (above 30k to 60k gallons)	462	154	462	0.1%	-	-	-	-	-	-	-	-	0.0%
Medium pool (15k to 30k gallons)	226	75	226	0.1%	-	-	-	-	-	-	-	-	0.0%
Small pool or spa (under 15k gallons)	-	51	-	0.0%	-	-	-	-	-	-	-	-	0.0%
Total Bermuda Turf Area	-	0.10	-	0.0%	-	-	-	-	-	-	-	-	0.0%
Total Overseeded Turf Area	-	0.02	-	0.0%	-	-	-	-	-	-	-	-	0.0%
Evaporative Cooling/ Cooling Towers	-	-	-	0.0%	-	-	-	-	-	-	-	-	0.0%
Category: Filter Backwash Flows & Make-up Water from Pools & Spas (rapid sand filters)													
Extra large pool (60k to 100k gallons)	-	-	-	-	228.6	-	0.0%	-	-	-	229	-	0.0%
Large pool (above 30k to 60k gallons)	514	-	-	-	171.4	514.3	0.1%	-	-	-	171	514	0.1%
Medium pool (15k to 30k gallons)	343	-	-	-	114.3	342.9	0.1%	-	-	-	114	343	0.1%
Small pool or spa (under 15k gallons)	-	-	-	-	57.1	-	0.0%	-	-	-	57	-	0.0%
TOTALS	438,913		64,766	14.8%		374,147	85.2%		35,537	8.1%		338,610	77.1%

F. TOTAL CONSUMPTIVE/NET WATER USE FOR THIS DEVELOPMENT (B. + D.) 100,304 GPD 22.9% OF TOTAL USE

NOTES:
 (1) PER 2018 DS&PM CHAPTER 6, FIGURE 6-1.2
 (2) VARIES FROM 8% TO 15%, TYPICALLY 10%
 (3) WASTEWATER FLOWS TO SEWER ARE CALCULATED AS C. MINUS D.
 GPD=GALLONS PER DAY, DU=DWELLING UNIT, FT2=SQUARE FEET, AC=ACRE, EA=EACH UNIT
 NONE OF THE VALUES OR CALCULATIONS HEREIN ARE INTENDED TO BE USED FOR INFRASTRUCTURE DESIGN, PEAK FLOW DETERMINATION, OR SYSTEM CAPACITY ANALYSIS. FOR THESE PURPOSES REFER TO CH.6 & 7 OF THE CITY'S DESIGN STANDARDS AND POLICY MANUAL FOR THE RESPECTIVE DESIGN VALUES AND PEAKING FACTORS.