



Preliminary Sewer Report

For

Arizona Farms

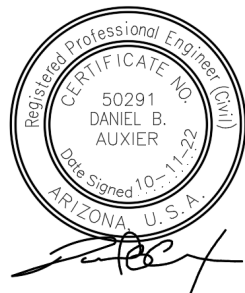
Pinal County, Arizona

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Project No. 21-0483

Date: October 2022

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1.0 Introduction

Arizona Farms, the Project, is a proposed residential development of 3,126 lots on approximately 760 acres. The site is bounded by E Arizona Farms Road to the north, N Felix Road to the East, E Heritage Road to the South, and the Copper Basin Railway to the West. By legal description, the property is located in a portion of land located in both Section 1, Township 4 South, Range 8 East, and Section 6, Township 4 South, Range 9 East of the Gila and Salt River Base Meridian, Pinal County, Arizona, Assessor Parcel Numbers (APN) 200-31-007B,D,E,F,G,K,L, 200-24-001R, and W.

This report will review the preliminary design of the Arizona Farms sewer system. The project will have two connection points into the existing sewer infrastructure. The first connection will be to an existing 12" sewer stub from the Silver Cross development, towards the north west corner of the site. The second connection point will be to a proposed 30" sewer line in Heritage Road. These connections are shown in the sewer exhibit in Appendix A.

The calculations of sewer flow and pipe sizing in this report were based on system design criteria in the EPCOR 2015 Developer & Engineering Guide, as well as ADEQ Bulletin 11 Chapter IV Section D.

2.0 Sewer Design

Wastewater from the North West portion of Arizona Farms will flow through 8" and 12" gravity lines to the south and west and connect to a stub provided by the adjacent Silver Cross development. These flows will include the flows from Parcel 1 of Arizona Farms and a portion of the flows produced on the western half of Dobbins Farms (approximately 1,338 lots), located directly north of the project. The rest of the site will flow south through 8", 10", 12", 18", 24" gravity lines to a proposed 30" sewer line in Heritage Road.

In addition to Arizona Farms flows, additional flows produced by future anticipated properties are also being accounted for in the sewer design. The eastern flows of Dobson Farms (approximately 4,662 lots) will combine with the project's flows and travel south through the project. South of the project there are two future developments labeled as Future Development 1 (170 lots), Future Development 2 (619 lots) as well as the Mesquite Trails Development (2,580 lots). There is a third potential future development (595 lots) directly northeast of the project. All five of these future developments projected flows have been accounted for in the sizing of the proposed Heritage Road sewer line.

All wastewater will ultimately flow to the Oasis Lift Station and then conveyed to the Johnson Ranch Section II Water Treatment Plant or the Anthem Water Treatment Plant. All flow directions are shown in the sewer exhibit in Appendix A.

All internal lines shall be sized taking into consideration prospective flows, minimum pipe sizes, and slopes. The use of pipes greater than 8" is done as only needed throughout the site. Eight-inch lines with a minimum slope of 0.368% are used throughout the Project when possible.

The following design considerations were estimated for this project:

- Designed with an average flow of 240 Gallons per day per dwelling unit per the EPCOR design standards for Single Family.
- Designed with an average flow of 180 Gallons per day per dwelling unit per the EPCOR design standards for Multi Family.
- Designed with an average flow of 1,500 Gallons per acre per the EPCOR design standards for Commercial.
- Peak flow and Manning's Equation ($n = 0.013$ for PVC SDR pipe) was used in determining pipe diameter. Pipes were sized to maintain the depth of flow less than 75% of the pipe diameter.
- A peaking factor of 3, was applied to the average daily sewer flows as outlined in EPCOR's standards.

2.1 Calculations

Peak Flow in GPD is calculated as:

$$\text{Design Flow} = \text{Peak Flow} = Q_{\text{Peak}} = Q_{\text{avg}} * \text{Peaking Factor}$$

Line Capacity (Q):

$$Q = \frac{1.49 AR^{2/3} S^{1/2}}{n}$$

Where

$$n = 0.013$$

A= Cross Sectional Area

R = Hydraulic Radius

S = Slope

Sewer flow calculations are shown in Appendix B.

2.2 Conclusions

- EPCOR design standards will be met.
- Sewer lines vary from 8" to 30" and are gravity fed.
- System will serve 3,126 lots.
- The Arizona Farms development will produce at peak 2,277,288 gallons of wastewater per day (3.52 cfs). Silver Cross will convey 59,040 (0.09 cfs) gpd of the Arizona Farms peak flow and Heritage Road will convey 2,218,248 gpd (3.43 cfs).

Appendix A:
Sewer Exhibit

Appendix B:
Sewer Calculations

Appendix A:
Sewer Exhibit

Appendix B:
Sewer Calculations

Average Daily Sewer Flows and Pipe Capacity Using Manning's Equation

Project: 21-0483 - Arizona Farms

Prepared by: Alexis Power

Date: 4/21/2022

Calculations Assume 240 GPD/DU for Single Family

Calculations Assume 180 GPD/DU for Multi-Family

Calculations Assume 1,500 Gallons per Acre for Commercial

Sewer Pipe Information				Additional Flow Information			Peak Demand Information						Full Flow Check		Non-Pressurized Flow Calculations					
Sewer Reach	Pipe Diameter (in)	Slope (ft/ft)	Manning's Roughness	Additional Contributing Lots	Other Additional Contributing Flow (GPD)	Additional Upstream Flow (GPD)	Cumulative Daily Flow (GPD)	Equivalent Population	Peaking Factor	Peak Demand (GPD)	Peak Demand (MGD)	Peak Demand (cfs)	Full Flow Capacity (cfs)	Pressurized Flow?	Theta of flow (rad)	Depth of Flow (ft)	Percent Full (d/D)	Area of Flow (ft ²)	Wetted Perimeter of flow (ft)	Velocity of Flow (fps)
AZ Farms Parcel 1	12	0.00257	0.013	82			19,680	82	3.00	59,040	0.059	0.091	1.81	NO	1.61	0.15	15%	0.0757	0.803	1.21
West Dobbins Farms Flows	12	0.00257	0.013	1,338			250,552	1,044	3.00	445,984	0.446	0.690	1.81	NO	2.85	0.43	43%	0.3210	1.426	2.15
Total Flows Northwest to Silver Cross	12	0.00257	0.013	1,338			270,232	1,126	3.00	505,024	0.505	0.781	1.81	NO	2.98	0.46	46%	0.3518	1.489	2.22
AZ Farms Parcels 2-23	8	0.00330	0.013	2,229			534,960	2,229	3.00	1,604,880	1.605	2.483	0.70	YES	6.28	0.67	100%	0.3491	2.094	7.11
AZ Farms Parcel 24	8	0.00330	0.013			46,008	46,008	192	3.00	138,024	0.138	0.214	0.70	NO	2.66	0.25	38%	0.1218	0.886	1.75
AZ Farms Parcel 25	8	0.00330	0.013			53,172	53,172	222	3.00	159,516	0.160	0.247	0.70	NO	2.79	0.27	41%	0.1353	0.928	1.82
AZ Farms Parcel 26	8	0.00330	0.013			47,601	47,601	198	3.00	142,803	0.143	0.221	0.70	NO	2.69	0.26	39%	0.1248	0.895	1.77
AZ Farms Parcel 27	8	0.0033	0.013			22,410	22,410	93	3.00	67,230	0.067	0.104	0.70	NO	2.15	0.17	26%	0.0726	0.715	1.43
AZ Farms Parcel 28	8	0.0033	0.013			28,635	28,635	119	3.00	85,905	0.086	0.133	0.70	NO	2.30	0.20	30%	0.0865	0.767	1.54
AZ Farms Parcel 29	8	0.0033	0.013			6,630	6,630	28	3.00	19,890	0.020	0.031	0.70	NO	1.57	0.10	15%	0.0316	0.523	0.98
Total AZ Farms Flows South to Heritage Road	30	0.00104	0.013				739,416	3,081	3.00	2,218,248	2.218	3.432	13.26	NO	2.52	0.87	35%	1.5135	3.150	2.27
East Dobbins Farms Flows	30	0.00104	0.013	4,662			872647.00	3,636	3.00	1,999,296	1.999	3.093	13.26	NO	2.44	0.82	33%	1.4042	3.052	2.20
Mesquite Trails	30	0.00104	0.013	2,580			619,200	2,580	3.00	1,857,600	1.858	2.874	13.26	NO	2.39	0.79	32%	1.3319	2.986	2.16
Future Development 1	30	0.00104	0.013	170			31,824	133	3.00	84,015	0.084	0.130	13.26	NO	1.08	0.18	7%	0.1548	1.350	0.84
Future Development 2	30	0.00104	0.013	618			148,320	618	3.00	444,960	0.445	0.688	13.26	NO	1.61	0.39	15%	0.4803	2.017	1.43

Average Daily Sewer Flows and Pipe Capacity Using Manning's Equation

Project: 21-0483 - Arizona Farms

Prepared by: Alexis Power

Date: 4/21/2022

Calculations Assume 240 GPD/DU for Single Family

Calculations Assume 180 GPD/DU for Multi-Family

Calculations Assume 1,500 Gallons per Acre for Commercial

Sewer Pipe Information				Additional Flow Information			Peak Demand Information						Full Flow Check		Non-Pressurized Flow Calculations					
Sewer Reach	Pipe Diameter (in)	Slope (ft/ft)	Manning's Roughness	Additional Contributing Lots	Other Additional Contributing Flow (GPD)	Additional Upstream Flow (GPD)	Cumulative Daily Flow (GPD)	Equivalent Population	Peaking Factor	Peak Demand (GPD)	Peak Demand (MGD)	Peak Demand (cfs)	Full Flow Capacity (cfs)	Pressurized Flow?	Theta of flow (rad)	Depth of Flow (ft)	Percent Full (d/D)	Area of Flow (ft ²)	Wetted Perimeter of flow (ft)	Velocity of Flow (fps)
Future Development 3	30	0.00104	0.013	595			142,800	595	3.00	428,400	0.428	0.663	13.26	NO	1.60	0.38	15%	0.4710	2.003	1.41
Total Flows to Heritage Road	30	0.00104	0.013				2,554,207	10,643	3.00	7,032,519	7.033	10.881	13.26	NO	3.92	1.72	69%	3.6086	4.898	3.02

Notes:

(1) Sewer Design flows per EPCOR Developer Engineering Guide 2015

(2) Minimum Pipe Slopes per EPCOR Developer Engineering Guide 2015

(3) "Dobbins Farms Flows" average day and peak values have been provided by EPCOR water

(4) EPCOR water provided the number of dwelling units for Mesquite Trails (2,580 DU) and future development 1 (170 DU). The pinal county assessor page was utilized to find the final plat of Future development 2 which contains 618 dwelling units. The number of dwelling units in future development 3 was calculated using acreage and an average of 3 DU based on adjacent developments. (1783.66 acres / 3 DU/Acre = 595 DU)