



 **FILE COPY**

**WASTEWATER MASTER PLAN /
BASIS OF DESIGN REPORT
FOR
DESERT MOUNTAIN PARCEL 19**

June 15, 2016

Revised August 5, 2016

WP# 164434

Prepared for:

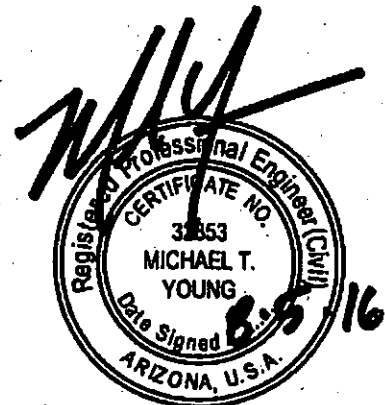
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EXPIRES 09-30-18

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1.0 INTRODUCTION

1.1 General Background and Project Location

Desert Mountain Parcel 19 (Site) is an approximate 91-acre proposed residential/golf course development in the City of Scottsdale, located between Cave Creek Road and existing church development on the south, Pima Road on the west, and the existing fire station and booster pump site and Desert Mountain development to the east and north (refer to Exhibit 1 – *Vicinity Map*). The property is located within Section 31, Township 6 North, Range 5 East, of the Gila and Salt River Meridian.

The Site is planned to include an 18-hole, short-game golf course, clubhouse, and residential housing. This Wastewater Master Plan / Basis of Design Report (Wastewater Master Plan/BOD) for the Site utilizes a site plan prepared concurrently by Greey | Pickett, dated June 10, 2016.

This Wastewater Master Plan/BOD Report has been prepared in accordance with Wood, Patel & Associates, Inc.'s (Wood/Patel) understanding of the City of Scottsdale's technical requirements for wastewater collection systems, as applicable for the Site.

1.2 Scope of Wastewater Master Plan / Basis of Design Report

The purpose of this Wastewater Master Plan/BOD Report is to determine wastewater design flows, pipe sizes, and sewer line locations, as required to provide wastewater service to the proposed development. The required infrastructure identified includes wastewater collection system mains and outfall locations.

1.3 Full Build-Out Condition

The design criteria utilized to calculate wastewater design flows and determine required pipe sizes for the Site are based on projected full build-out conditions. The current zoning for the Site consists of I-1 ESL, C-0 ESL, C-2 ESL, R1-7 ESL, and R1-35. This report is based on the assumption that the rezoning case will change the zoning to Residential R-4 and OS ESL.

2.0 DESIGN DOCUMENTATION

2.1 Design Criteria

For the purpose of this Wastewater Master Plan/BOD Report, wastewater design flows and pipe-sizing criteria utilized are based on Wood/Patel's understanding of the following:

- Applicable wastewater system design criteria listed in the *City of Scottsdale Design Standards & Policies Manual*, dated January 2010; and
- Title 18, Chapter 9 of the *Arizona Administrative Code*;

Refer to Table 1 – *Wastewater Collection System Design Criteria* for detailed information regarding design criteria.

2.2 Wastewater Design Flows

Wastewater design flows for the Site were estimated using design criteria listed in Section 2.1 – *Design Criteria*. Wastewater design flows generated by the offsite and onsite areas are summarized as follows:

ANTICIPATED DESERT MOUNTAIN OFFSITE WASTEWATER FLOWS			
Type	Adjacent Node	Average Daily Flow (gpd)	Peak Flow (gpd)
Existing Fire Station	EX-MH-3	540	2,430
TOTAL		540	2,430

ANTICIPATED DESERT MOUNTAIN PARCEL 19 ONSITE WASTEWATER FLOWS TO PIMA ROAD			
Type	Adjacent Nodes	Average Daily Flow (gpd)	Peak Flow (gpd)
Proposed Single Family Residences	MH-1 to MH-27	47,500	190,000
Proposed Clubhouse	MH-8	20,000	90,000
TOTAL		67,500	280,000

Detailed design flow calculations are provided in Table 2 – *Offsite Wastewater Flows*, Table 3 – *Onsite Wastewater Design Flows*, and Table 4 – *Wastewater Model, Full Build-Out Condition*. Refer to Table 5 – *Calculated Pipe Capacities, Full Build-Out Condition* for pipe capacities. For the layout of the proposed wastewater collection system, refer to Exhibit 2 – *Wastewater Exhibit - Full Build-Out*.

3.0 EXISTING CONDITIONS

3.1 Topographic Conditions

The proposed project lies in the northern planning section of the City of Scottsdale. The Site generally slopes from east to west, at approximately 3 percent. Elevations range from 2,645 feet above mean sea level (MSL) in the east, to 2,585 feet MSL in the west. The Site is covered with typical Sonoran Desert vegetation including mesquite trees, saguaro cactus, creosote, etc. In addition, existing dirt roads to access the existing onsite wells are located throughout the Site.

3.2 Existing Offsite Wastewater Infrastructure

Relevant public wastewater collection systems near the Site include the following:

- An existing 18-inch gravity sewer located along Pima Road, from the north property boundary of the Site to Carefree Drive, connecting to an existing 21-inch gravity sewer from Carefree Drive to Cave Creek Drive.
- An existing 12-inch gravity sewer located northeast of the Site and connecting to the existing onsite 15-inch gravity sewer along the northern boundary of the Site.

According to the *2008 Integrated Wastewater Master Plan*, wastewater generated on the Site will be treated at the Water Campus Water Reclamation Plant (WCWRP) located near Pima Road and the AZ Loop 101. The WCWRP is the primary treatment facility for wastewater generated in the northern portions of the City of Scottsdale.

3.3 Existing Onsite Wastewater Infrastructure

A portion of the Site has access roads to a City of Scottsdale Potable Water Booster Pump Station and existing well sites. It is Wood/Patel's understanding that no existing onsite wastewater infrastructure exists along these access roads. However, two (2) existing gravity sewers located within the Site include:

- An existing 15-inch gravity sewer located along the northern property boundary and connecting to the existing gravity sewer located in Pima Road.
- An existing 8-inch gravity sewer located along the Twilight Drive alignment and extending to the adjacent Cave Creek Road alignment. This existing gravity sewer then extends west along the southern property boundary to connect to the existing gravity sewer within Pima Road. Development of Parcel 19 proposes to abandon this portion of sewer.

4.0 PROPOSED WASTEWATER COLLECTION SYSTEM

4.1 Sewer Pipe Sizing

Pipes for the Site were sized to accommodate peak wet-weather flow conditions at full build-out for the Site. Using the design criteria previously mentioned, the resulting sewer system consists of gravity-fed, 8-inch sewer pipes. Refer to Exhibit 2 for the proposed wastewater collection system configuration.

4.2 Sewer Layout

The sewer layout generally follows the natural topography of the Site, sloping in a southwesterly direction. The proposed wastewater collection system meets the minimum depth of cover requirements established by the City of Scottsdale (Ref. 1). The proposed wastewater collection system will outfall to the existing 21-inch sewer in two (2) locations. The first outfall location is near the intersection of Carefree Drive and Pima Road. The second outfall location is approximately 1,400 feet north of the intersection of Pima Road and Cave Creek Road.

5.0 CONCLUSIONS

This Wastewater Master Plan / Basis of Design Report, as presented, meets City of Scottsdale standards and requirements, and serves as a guide for construction documents associated with the proposed wastewater collection system. The following items highlight critical conclusions:

1. Wastewater design flows and proposed wastewater collection system for full build-out was analyzed.
2. The approximate average daily flow generated at full build-out by Desert Mountain Parcel 19 is 67,500 GPD, per section 2.2 of this report.
3. Wood/Patel's model of the proposed wastewater collection system provides system conveyance and capacity in conformance to City of Scottsdale's standards and Title 18, Chapter 9 of the *Arizona Administrative Code*.
4. Onsite wastewater flows will outfall to the existing 21-inch gravity sewer along Pima Road in 2 locations; the intersection of Carefree Drive and Pima Road, and approximately 1,400 feet north of the intersection of Pima Road and Cave Creek Road.
5. It is Wood/Patel's understanding that the proposed wastewater collection system conforms to the City of Scottsdale's adopted *Integrated Master Wastewater Plan*, dated March 2008.

6.0 REFERENCES

1. *Design Standards & Policies Manual*, City of Scottsdale, January 2010.
2. *Arizona Administrative Code, Title 18, Chapter 9*, Arizona Department of Environmental Quality, 2005.
3. *2008 Integrated Wastewater Master Plan*, City of Scottsdale, March 2008.

EXHIBIT 1

VICINITY MAP



I:\2010\1044\41\Project Support\Reports\water BOD\Exhibits\434-Exhibit 1-vicinity map.dwg

WOOD/PATEL MISSION: CLIENT SERVICE * (602) 335-8500 WWW.WOODPATEL.COM	DESERT MOUNTAIN	
	EXHIBIT 1 VICINITY MAP	
	DATE: 6-13-2016	SCALE: 1" = 500'

TABLE 1

**WASTEWATER COLLECTION SYSTEM
DESIGN CRITERIA**

Project: Desert Mountain
 Location: Scottsdale, AZ
 Reference: 2010 City of Scottsdale Design Standards & Policies Manual

Proj. Number: 164434
 Proj. Engineer: Mike Young, P.E.

UNIT DAILY RESIDENTIAL WASTEWATER FLOWS

Description	Value	Units	Notes(s)
General			
Minimum Full-Flow Velocity	2.5	ft/sec	1
Maximum Peak Flow Velocity	10	ft/sec	1
Minimum Cover on Sanitary Sewer Pipe	4	feet	1
Maximum Peak Flow Depth-to-Diameter Ratio (d/D) for Sewer Pipes 12 Inches in Diameter or Less	0.65	-	1
Maximum Peak Flow Depth-to-Diameter Ratio (d/D) for Sewer Pipes Greater than 12 Inches in Diameter	0.7		1
Minimum Pipe Diameter	8	in	1
Manning's "n" value	0.013	-	1
Peaking Factor (Single Family Residential for sanitary sewer lines 8 to 12 inches in diameter)	4.0		1
Peaking Factor (Resort Hotel)	4.5		1,2
Residential			
Average Day Wastewater Flow per Person (Pipes with 8 to 12 inch diameters)	100	GPD/person	1
Population Density	2.5	persons/du	1
Average Day Wastewater Flow per Dwelling Unit (Pipes with 8 to 12 inch diameters)	250	GPD/du	1
Average Day Wastewater Design Flows, Non-Residential			
Country Club Amenities (Resident Member)	100	GPD/Resident Member	3

Notes:

1. Per City of Scottsdale Design Standards & Policies Manual
2. This peaking factor was used for modeling the Clubhouse.
3. Per Table 1- Unit Design Flows from the Arizona Administrative Code, Title 18, Chapter 9

TABLE 2

OFFSITE WASTEWATER FLOWS

Project: Desert Mountain
Location: Scottsdale, Arizona

Proj. Number: 164434
Proj. Engineer: Mike Young, P.E.

OFFSITE LAND USE									
Land Use	Non-Residential Acres	Population Density (employees/station)		Commercial/Industrial/Retail S.F.	Unit Daily Wastewater Flow (GPD/Employee) ¹		Total Avg Day (GPD)	Peaking Factor	Peak Wet Weather Flow (GPD)
Existing Fire Station	1	12	Employees	7,000	45	GPD/Employee	540	4.5	2,430
Offsite Totals							540		2,430

Notes:

1. Per Table 1- Unit Design Flows from the Arizona Administrative Code, Title 18, Chapter 9

TABLE 3

ONSITE WASTEWATER DESIGN FLOWS

Project: Desert Mountain
 Location: Scottsdale, Arizona

Proj. Number: 164434
 Proj. Engineer: Mike Young, P.E.

PROPOSED 8-INCH SEWER DESIGN FLOWS											
Land Use	No. of DUs	Residential Acres	Non-Residential Acres	Population Density (patrons/day)		Commercial/Retail S.F.	Unit Daily Wastewater Flow (GPD/DU, Person)		Total Avg Day (GPD)	Peaking Factor	Peak Wet Weather Flow (GPD)
Single Family Residential	190	36.0	-	-	-	-	250	GPD/DU	47,500	4.0	190,000
Clubhouse	-	-	2.0	200	Patrons/Day ¹	5,000	100	GPD/Person	20,000	4.5	90,000
Total Onsite Wastewater Flow to Pima Road (GPD)											
	190	36.0	2.0			5,000			67,500		280,000

1) The estimated number of patrons utilizing the clubhouse daily, assumes a group of 4 patrons having a golf tee time every 15 minutes. Assuming the clubhouse is open for 12 hours, the total number of patrons is equal to 16 patrons/hour*12 hours=192 patrons/day. Adding 8 employees results in approximately 200 Patrons/Day utilizing the clubhouse.

TABLE 4

**WASTEWATER MODEL –
FULL BUILD-OUT CONDITION**

Project: Desert Mountain
 Location: Scottsdale, AZ
 References: Arizona Administrative Code, Title 18, Chapter 9
 City of Scottsdale 2009 Design Standards & Policies Manual, Chapter 7 Wastewater

Proj. Number: 164434
 Proj. Engineer: Mike Young, P.E.

FROM NODE	TO NODE	SEWER AREA(S) SERVED/Number of Dues	PARCEL ADF (GPD)	TOTAL ADF (GPD)	PEAKING FACTOR	PEAK WET WEATHER FLOW (GPD)
OFFSITE WASTEWATER FLOWS						
EX-MH-5	MH-9	Fire Station	540	540	4.5	2,430
Total Offsite Flows			540	540		2,430
FULL BUILD OUT ONSITE WASTEWATER FLOWS						
MH-27	MH-26	13	3,250	3,250	4.0	13,000
MH-26	MH-25	14	3,500	6,750	4.0	27,000
MH-25	MH-24	5	1,250	8,000	4.0	32,000
MH-24	MH-23	7	1,750	9,750	4.0	39,000
MH-23	MH-22	7	1,750	11,500	4.0	46,000
MH-22	MH-21	4	1,000	12,500	4.0	50,000
MH-21	MH-20	4	1,000	13,500	4.0	54,000
MH-20	MH-19	4	1,000	14,500	4.0	58,000
MH-19	MH-18	7	1,750	16,250	4.0	65,000
MH-18	MH-10	5	1,250	17,500	4.0	70,000
MH-17	MH-13	7	1,750	1,750	4.0	7,000
MH-16	MH-15	5	1,250	1,250	4.0	5,000
MH-15	MH-14	7	1,750	3,000	4.0	12,000
MH-14	MH-13	4	1,000	4,000	4.0	16,000
MH-13	MH-12	10	2,500	8,250	4.0	33,000
MH-12	MH-11	10	2,500	10,750	4.0	43,000
MH-11	MH-10	9	2,250	13,000	4.0	52,000
MH-10	EX-MH-2	4	1,000	31,500	4.0	126,000
EX-MH-3	MH-9	Fire Station	540	540	4.5	2,430
MH-9	MH-8	-	-	540	-	2,430
MH-8	MH-7	Clubhouse	20,000	20,540	4.5	92,430
MH-7	MH-6	-	-	20,540	4.0	82,430
MH-6	MH-4	4	1,000	21,540	4.0	86,430
MH-5	MH-4	11	2,750	2,750	4.0	11,000
MH-4	MH-3	12	3,000	27,290	4.0	119,430
MH-3	MH-2	17	4,250	31,540	4.0	136,430
MH-2	MH-1	20	5,000	36,540	4.0	156,430
MH-1	EX-MH-1	0	0	36,540	4.0	156,430
Totals		190	68,040	68,040		282,430
Total Onsite Flow to Pima Road Gravity Sewer (Pima Road & Carefree Drive)			-	31,500		126,000
Total Onsite and Offsite Flow to Pima Road Gravity Sewer (500 feet South of Short Putt Place)			-	36,540		156,430
Total Onsite and Offsite Flow to Pima Road Gravity Sewer			-	68,040		282,430

TABLE 5

**CALCULATED PIPE CAPACITIES –
FULL BUILD-OUT CONDITION**

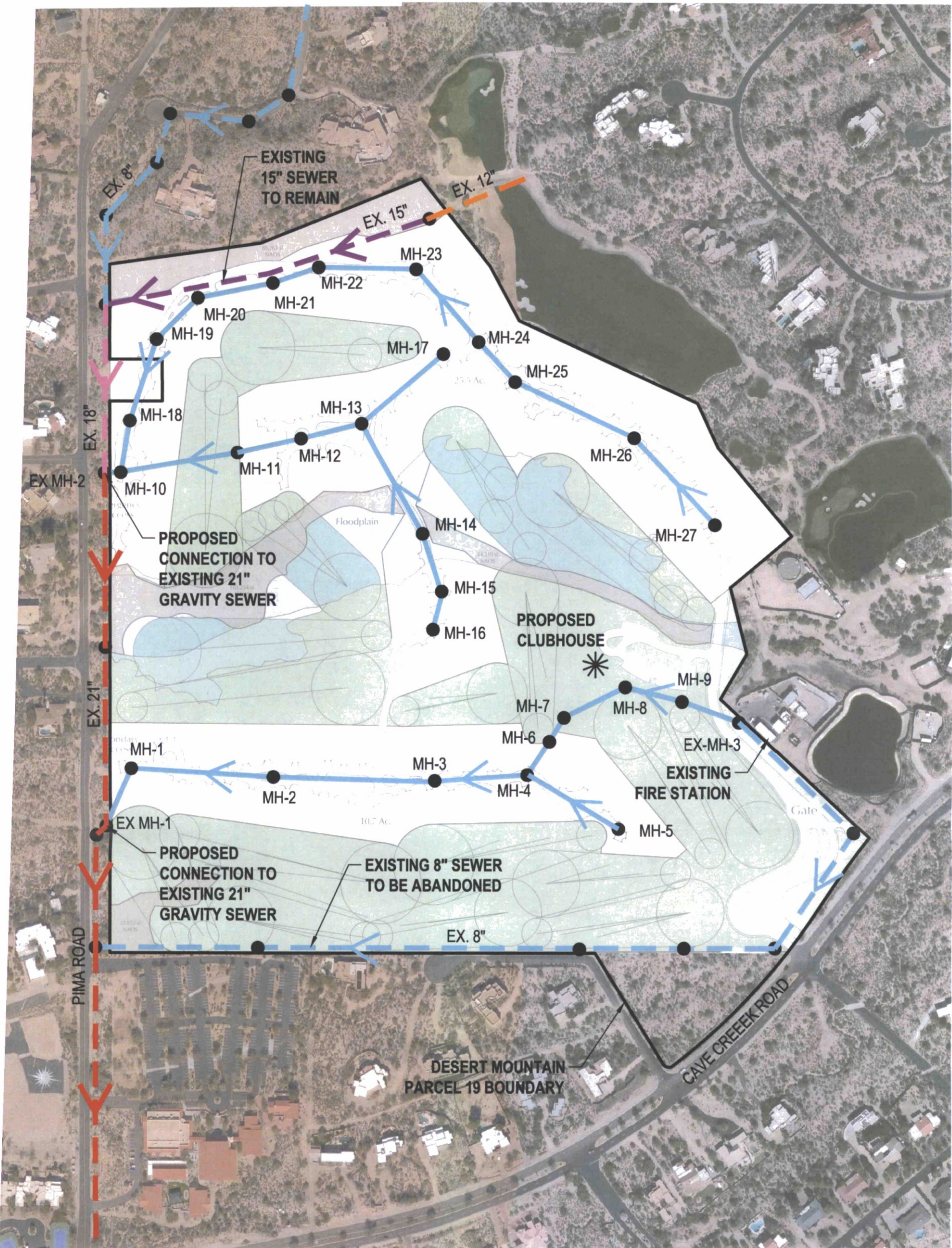
Project: Desert Mountain
 Location: Scottsdale, Arizona
 References: Title 18, Chapter 9 of the Arizona Administrative Code
 City of Scottsdale 2010 Design Standards & Policies Manual, Chapter 7 Wastewater

Proj. Number: 164434
 Proj. Engineer: Mike Young, P.E.

FROM NODE	TO NODE	NOTES	PIPE DIA. (INCHES)	MODELED PIPE SLOPE (FT / FT)	PIPE CAPACITY		PEAK FLOW RESULTS					
					GPD	GPM	PEAK WET WEATHER FLOW (GPD)	PEAK WET WEATHER FLOW (GPM)	d/D (WET WEATHER)	FLOW VELOCITY (FT/S) AT d/D=0.85	SURPLUS CAPACITY (WET WEATHER) (GPD)	PERCENT OF CAPACITY (WET WEATHER)
Onsite Pipe Sizes												
EX-MH-5	MH-9	Proposed	8	0.0095	767,080	533	2,430	2	0.04	3.7	784,850	0.3%
Full Build-Out Onsite Pipe Sizes												
MH-27	MH-28	Proposed	8	0.0245	1,218,304	846	13,000	8	0.07	5.9	1,205,304	1.1%
MH-28	MH-25	Proposed	8	0.0143	925,008	642	27,000	19	0.12	4.5	898,008	2.8%
MH-25	MH-24	Proposed	8	0.0099	789,841	548	32,000	22	0.14	3.8	757,841	4.1%
MH-24	MH-23	Proposed	8	0.0166	1,105,498	785	38,000	27	0.13	5.4	1,067,498	3.8%
MH-23	MH-22	Proposed	8	0.0248	1,240,885	862	48,000	32	0.13	8.0	1,192,885	3.7%
MH-22	MH-21	Proposed	8	0.0458	1,589,527	1,159	50,000	35	0.12	8.1	1,619,527	3.0%
MH-21	MH-20	Proposed	8	0.0154	970,131	674	54,000	38	0.16	4.7	916,131	5.6%
MH-20	MH-19	Proposed	8	0.0098	767,080	533	58,000	40	0.19	3.7	709,080	7.6%
MH-19	MH-18	Proposed	8	0.0108	812,202	584	85,000	45	0.19	4.0	747,202	8.0%
MH-18	MH-10	Proposed	8	0.0295	1,353,671	940	70,000	49	0.16	6.6	1,283,671	5.2%
MH-17	MH-13	Proposed	8	0.0219	1,150,820	799	7,000	5	0.08	5.6	1,143,820	0.6%
MH-16	MH-15	Proposed	8	0.0087	721,958	501	5,000	3	0.06	3.5	716,958	0.7%
MH-15	MH-14	Proposed	8	0.0098	787,080	533	12,000	8	0.09	3.7	755,080	1.6%
MH-14	MH-13	Proposed	8	0.0097	767,080	533	16,000	11	0.10	3.7	751,080	2.1%
MH-13	MH-12	Proposed	8	0.0097	767,080	533	33,000	23	0.14	3.7	734,080	4.3%
MH-12	MH-11	Proposed	8	0.0093	744,519	517	43,000	30	0.16	3.8	701,519	5.8%
MH-11	MH-10	Proposed	8	0.0351	1,466,476	1,018	52,000	38	0.13	7.1	1,414,476	3.5%
MH-10	EX-MH-2	Proposed	8	0.0521	1,782,333	1,238	128,000	86	0.18	8.7	1,654,333	7.1%
EX-MH-3	MH-9	Proposed	8	0.0095	767,080	533	2,430	2	0.04	3.7	784,850	0.3%
MH-9	MH-8	Proposed	8	0.0109	812,202	584	2,430	2	0.04	4.0	809,772	0.3%
MH-8	MH-7	Proposed	8	0.0498	1,737,211	1,208	92,430	64	0.18	8.5	1,644,781	5.3%
MH-7	MH-6	Proposed	8	0.0084	721,958	501	82,430	64	0.24	3.5	629,528	12.8%
MH-6	MH-4	Proposed	8	0.0078	699,396	488	96,430	67	0.25	3.4	602,966	13.8%
MH-5	MH-4	Proposed	8	0.0149	847,589	658	11,000	8	0.08	4.6	836,589	1.2%
MH-4	MH-3	Proposed	8	0.0104	789,841	548	119,430	83	0.28	3.8	670,211	15.1%
MH-3	MH-2	Proposed	8	0.0252	1,240,885	862	138,430	85	0.23	6.0	1,104,435	11.0%
MH-2	MH-1	Proposed	8	0.0217	1,150,820	799	156,430	109	0.25	5.6	994,190	13.6%
MH-1	EX-MH-1	Proposed	8	0.0612	1,940,261	1,347	156,430	109	0.19	9.4	1,783,831	8.1%

EXHIBIT 2

WASTEWATER EXHIBIT – FULL BUILD-OUT



LEGEND

- 8" PLANNED SEWER
- 8" EXISTING SEWER
- 12" EXISTING SEWER
- 15" EXISTING SEWER
- 18" EXISTING SEWER
- 21" EXISTING SEWER

N



0 300 600

Horz. 1 in. = 300 ft.

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DESERT MOUNTAIN P1

**EXHIBIT 2-
WASTEWATER EXHIBIT**

DATE 06-10-16	SCALE 1" = 300'	SHEET 1 OF 1
JOB NO. 164434	DESIGN SM DRAWN SM	CHECK DC