HUBBARD ENGINEERING

ANDAZ RESORT EXPANSION
SEWER SYSTEM ANALYSIS REPORT
May 17, 2022

Project Description:

The project site is rectangular in shape and encompasses approximately 5.03 acres and is currently undeveloped and vacant. The proposed development for the site includes construction of 10 new villas, ranging in size from approximately 2,145 sq. ft. (2-bedroom) to 4,070 sq. ft. (4-bedroom) with a new private 24-foot wide access drive. Proposed improvements will also include extensions of the private on-site sewer, water and fire lines to provide service to each villa and a proposed stormwater retention basin located at the south side of the site to provide the required stormwater retention volume.

The intent of this sewer design memo is to verify capacity of the new 8" private sewer main and that the existing downstream 8" public sewer line (owned by the City of Scottsdale) is sufficient to service the development. The existing on-site private sewer line ultimately connects to the City of Scottsdale public sewer in Rose Lane.

Site Information:

Assessor's Parcel No.: 174-65-004C

Site Address: 6041 N. Quail Run
Paradise Valley, AZ 85253

Site Area: 219,027 sq. ft. (5.03 acres)

Sewer Demand Calculations:

To determine the unit wastewater loads, the following references were used:

- City of Scottsdale Design Standards & Policies Manual (DSPM), 2018.

Currently the site is zoned R-43 (single-family residential) however, as part of the development, the parcel is anticipated to be rezoned to SUP Resort. Given the proposed improvements include the construction of 10 new villas, the proposed usage is assumed to be more closely related to that of single-family residential, therefore the proposed sewer demands were determined by using the Residential Design Flow criteria outlined in the City of Scottsdale DSPM, as such:

- Sanitary sewer lines 8 to 12 inches in diameter will be designed using 100 gallons per capita per day (gpcpd) and a peaking factor of 4.
- Residential densities are to assume 2.5 persons per dwelling unit.

Therefore, the proposed *Average Daily Flow* is:

Total Average Daily Flow = (100 gpcpd) x (2.5 persons/DU) x (10 DUs) =

2,500 gal/day (1.74 gal/min)

Applying the peaking factor of 4 to determine *Total Peak Flow*:

Total Peak Flow = (4.0) x (2,500 gal/day) =

10,000 gal/day (6.94 gal/min)

Pipe Velocity and Capacity Calculations for Proposed Sewer Extension:

In accordance with the City of Scottsdale's DSPM, the depth to diameter ratio (d/D) for gravity sewer lines 12 inches in diameter or less shall not exceed 0.65 in the ultimate peak flow conditions. As such, the capacity of the proposed 8" diameter sewer was determined by setting the d/D ration at 0.65 to determine maximum design depth and then calculating the velocity and flow capacity using Manning's Equation. The results are summarized in the table below:

Sewer Size (D):	8	inches	
Mannings n-value (*n*):	0.013		
Slope (S):	0.010	ft/ft	
Hydraulic Radius (R):	0.192	ft	For d/D = 0.65
Manning Equation:	$V = (k/n) \times (R)^{2/3} \times (S)^{1/2}$		k = 1.486
Velocity (V), for d/D=0.65:	3.80	ft/sec	Min = 2.5 ft/sec Max = 10.0 ft/sec
Pipe Capacity:	**0.91**	**cfs**	**Q = V x A**
	588,148	**gal/day**	***OK***

Evaluation of Existing Downstream Public Sewer:

To determine the effects of the proposed improvements on the existing downstream public sewer, the calculated *Total Peak Flow* from above was added to the overall contributing flows from the existing resort at the connection point to the public sewer at Rose Lane. Per the Wastewater Basis of Design Report prepared by Hubbard Engineering, dated June 1, 2015, the contributing peak flows for the original Andaz Resort improvements are summarized below:

Total Peak Flow = 424,789 gal/day

To analyze the existing 8" public sewer at the downstream connection, the proposed Total Peak Flow of 10,000 gal/day from the proposed improvements is added to overall Total Peak Flow listed above:

DS Total Peak Flow = 424,789 gal/day + 10,000 gal/day =

424,789 gal/day (295.00 gal/min) = 0.672 cfs

Calculating the full flow capacity of the existing 8" diameter downstream public sewer shows the existing line will have the capacity to handle the additional flow from the proposed improvements:

Sewer Size (D):	8	inches	
Mannings n-value (*n*):	0.013		
Slope (S):	0.0052	ft/ft	
Hydraulic Radius (R):	0.167	ft	R=D/4 (full pipe)
Manning Equation:	$V = (k/n) \times (R)^{2/3} \times (S)^{1/2}$		k = 1.486
Velocity (V), full pipe:	2.50	ft/sec	Min = 2.5 ft/sec Max = 10.0 ft/sec
Pipe Capacity:	**0.87**	**cfs**	**Q = V x A**
	562,296	**gal/day**	***OK***

Please note that this analysis is conceptual in nature to determine the feasibility of the existing sanitary sewer system to convey the additional flows from the proposed site development. A more detailed evaluation will be provided during the permitting process and closely coordinated with the City of Scottsdale as the owner of the downstream public sewer.

For further reference, a copy of the sewer capacity letter from the original Andaz Resort improvements is attached, citing Intergovernmental Agreement No. 980154 between the Town of Paradise Valley and the City of Scottsdale for acceptance and conveyance of sanitary sewage. It is anticipated that an updated copy of this letter will be obtained from the City of Scottsdale prior to the proposed development coming on-line.

Water Resources

9379 E. San Salvador
Scottsdale, AZ 85258

PHONE 480-312-5685
FAX 480-312-5615

July 10, 2013

Hubbard Engineering
1840 S. Stapley Drive, Suite 137
Mesa, AZ 85204

Attn: Shannon Wolfe, PE

Re: Sanitary sewer service to The Cottonwoods Resort in Paradise Valley, AZ

Dear Ms. Wolfe,

You have provided our City with an estimate of the proposed sanitary sewer flows to be generated by redevelopment of the Cottonwoods Resort property. These flows will not exceed the purchased capacity as described in Intergovernmental Agreement No. 980154 between the Town of Paradise Valley and the City for the acceptance and conveyance of sanitary sewage.

The City of Scottsdale's sanitary sewer collection system has sufficient capacity to accept the proposed flows and convey them to the City of Scottsdale's Princess metering station. Downstream of the Princess metering station, these flows enter into the Sub-regional Operating Group (SROG) Salt River Outfall (SRO) trunk line.

The City of Scottsdale has established operational requirements and maintenance procedures to assure efficient conveyance of sanitary sewer flows throughout its collection system.

If you have any questions regarding this information, please contact our office at 480-312-5685.

Sincerely,

Douglas L. Mann
Principal Planner

Email: Shannon Wolfe <swolfe@hubbardengineering.com>