Appendix G

Preliminary Domestic Water and Sanitary Sewer Demand Memorandum

TECHNICAL MEMORANDUM

Date: May 13, 2022 **BKF Job Number:** C20212113-10

Deliver To: Jenn Bodine, Smith Development

From: Mona Sadeghian, BKF
Tom Morse, BKF

Subject: 660 University Avenue
Preliminary Domestic Water and Sanitary Sewer Demand Memorandum

Purpose

The purpose of this memorandum is to provide information regarding impacts to the domestic water and sewer systems as a result of the proposed redevelopment project.

Domestic Water System Background

The existing site is occupied by two buildings and a parking lot. The three lots will be merged into a single parcel totaling approximately 0.52 acres. The site is bounded by Byron Street, University Avenue, Middlefield Road, Cardinal Dental, and a private residence. The site is currently served by a 6-inch domestic water main in Byron Street and a 6-inch domestic water main in University Avenue. A lateral from the Byron Street main extends into the west side of the project site and a lateral from the University Avenue main extends into the north side of the project site.

The proposed site consists of a commercial space and 65 residential units. The site will be serviced by a 4-inch residential domestic water lateral that stems off the 6-inch main in Byron Street and a 2-inch commercial domestic water lateral and a 1.5-inch irrigation lateral that stem off the 12-inch main in Middlefield Road.

Domestic Water System Existing Demand

Domestic water system existing demands are included in Attachment A - Table 1. The total domestic water demand is based on the demand for the existing buildings. The total existing domestic water demand is 1,035 gallons per day (gpd).

Domestic Water System Proposed Demand

Proposed domestic water demands are included in Attachment A - Table 2. The total domestic water demand is based on the demand for the proposed commercial space and 65 residential units. The total proposed domestic water demand is 12,387 gpd.

Sewer System Background

The site is currently served by a 5.4-inch sanitary sewer main in Byron Street and a 12-inch sanitary sewer main in Middlefield Road. A lateral from the Byron Street main extends into the west side of the project site and a lateral from the Middlefield Road main extends into the east side of the project site.

The proposed site will be serviced by a 4-inch residential sanitary sewer lateral that stems off the 5.4-inch main in Byron Street and a 4-inch commercial sanitary sewer lateral that stems off the 12-inch main in Middlefield Road.

Sewer System Existing Demand

Existing sewer demands are included in Attachment A - Table 1. The total sewer demand is based on the demand for the existing buildings. The total existing sewer demand is 983 gpd.

Sewer System Proposed Demands

Proposed sewer demands are included in Attachment A - Table 2. The total sewer demand is based on the demand for the proposed commercial space and 65 residential units. The total proposed sewer demand is 11,767 gpd.

Conclusion

The proposed redevelopment is estimated to use 12,387 gallons of water per day. The redevelopment will be served through laterals off the 6-inch domestic water main in Byron Street and the 12-inch domestic water main in Middlefield Road. Compared to the existing demand of 1,035 gallons per day, the redevelopment represents an increase of 11,352 gallons per day for the municipal water system.

The proposed redevelopment is estimated to generate an average of 11,767 gallons of wastewater per day. The redevelopment will direct the sewage through the existing municipal 5.4-inch sewer main in Byron Street and the 12-inch sewer main in Middlefield Road. Compared to the 983 gallon per day currently generated by the site, the redevelopment represents an increase of 10,784 gallons per day for the municipal sewer system.

ATTACHMENTS:

Attachment A: Water and Sewer Demand Summary

Attachment B: 2021 Water Gas & Wastewater Utility Standards

Attachment A: Water and Sewer Demand Summary

Table 1: Existing Project Water and Sewer Demand

DESCRIPTION OF USE				SEWER DEMAND		POTABLE WATER DEMAND	
			Unit Demand	Average Daily Demand		Average Daily Demand	
Land Use	Value	Unit	(g/unit)	(gpd)	(gpm)	(gpd)	(gpm)
Existing Building 1	**2,623**	**SF**	**0.15**	393	0.27	414	0.29
Existing Building 2	**3,932**	**SF**	**0.15**	590	0.41	621	0.43
Total Demand				**983**	**0.68**	**1,035**	**0.72**

Table 2: Proposed Project Water and Sewer Demand

DESCRIPTION OF USE				SEWER DEMAND		POTABLE WATER DEMAND	
			Unit Demand	Average Daily Demand		Average Daily Demand	
Land Use	Value	Unit	(g/unit)	(gpd)	(gpm)	(gpd)	(gpm)
Proposed Commercial	**9,115**	**SF**	**0.15**	1,367	0.95	1,439	1.00
Proposed Residential	**65**	**Units**	**160**	10,400	7.22	10,947	7.60
Total Demand				**11,767**	**8.17**	**12,387**	**8.60**

Table 3: Net Project Water and Sewer Demand

DESCRIPTION OF USE	SEWER DEMAND		POTABLE WATER DEMAND	
	Average Daily Demand		Average Daily Demand	
Land Use	(gpd)	(gpm)	(gpd)	(gpm)
Total Existing Demand	983	0.68	1,035	0.72
Total Proposed Demand	11,767	8.17	12,387	8.60
Total Demand Increase	**10,784**	**7.49**	**11,352**	**7.88**

Notes:

1 Unit demands based on 2021 Water Gas & Wastewater Utility Standards for sewer: 0.15 gpd/sf for commercial and 160 gpd/unit for residential. See Attachment B.

2 Per industry standard, sewer demand assumed to be 95% return of potable water.

and a minimum of 1.0.

PBWF = ABWF x Peaking Factor

2. **Groundwater Infiltration (GWI):** Groundwater infiltration is groundwater that enters the collection system from defects in the pipes, pipe joints, and sewer structures. The amount of GWI entering the collection system depends on the structural condition of the system, the depth of the pipes, and the elevation of the groundwater table relative to the elevation of the sewer pipes. GWI tends to decrease during the dry-weather seasons and gradually increases as the wet-weather season progresses. GWI is calculated by applying the GWI unit flow rate that corresponds to the tributary area. GWI unit flow rate is shown in Table 1-1.

3. **Rainfall-Dependent Inflow (RDI):** Rainfall-Dependent Inflow is storm water that enters the collection system in direct response to the intensity and duration of individual rainfall events. In addition to being dependent on rainfall events, RDI is sensitive to soil moisture, increasing throughout the wet-weather season as the soil moisture increases. A 20-year storm event shall be used to determine estimated RDI for new sewers. RDI is calculated by applying the RDI unit flow rate that corresponds to the tributary area. RDI unit flow rate is shown in Table 1-1.

Table 1-1 Unit Flow Rates for ABWF, GWI, and RDI*

Average Base Wastewater Flow (ABWF)

Land Use Category	Land Use Designation**	Unit	Unit Flow Rate (gpd/unit)
Residential			
Single Family	SF	Dwelling Unit	220
Multi-Family	MF	Dwelling Unit	160
Transit-Oriented	CC	Dwelling Unit	160
Commercial	CS, CN, CH	Building Sq. Ft.	0.15
Research/Office Park	RO	Building Sq. Ft.	0.10
Light Industrial	LI	Building Sq. Ft.	0.10
Major Institutional	MISP	Building Sq. Ft.	0.15
School	S	Student	15

Groundwater Infiltration (GWI) = 500 gpd/acre
Rainfall-Dependent Inflow (RDI) = 1,900 gpd/acre

* All rates are based on the 2004 Wastewater Collection System Master Plan.
** Land Use Designations based on Palo Alto's Planning Land Use Designations.

1.02 PIPE CAPACITY

The theoretical capacity of new pipes shall be calculated using Manning's equation. The "n" value (Manning's roughness coefficient) shall be equal to 0.009 for all HDPE sewer pipes.

Manning's Equation:

$Q\ (cfs) = (1.49 / n) \times A \times R_h^{2/3} \times S^{1/2}$

Q = Flow (cfs)
n = Manning's roughness coefficient
A = Flow Area (ft^2)