SEWER DEMAND STUDY

PREPARED FOR:

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FOR THE PROJECT:

Palmdale Beyond Market & Carwash Development

Palmdale, CA

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I.INTRODUCTION

Blue Engineering and Consulting, Inc. has been asked to prepare a Sewer Capacity Study for the proposed Beyond Foods Mart Palmdale Development project. The project located on the northwest corner of 25th Street and East Avenue R in the City of Palmdale in Los Angeles County, California (see attached vicinity map, Appendix A). The site is bordered to the north by an apartment complex, to the south by East Avenue R, to the east by 25th Street, and Palmdale High School to the west. The projects wastewater is conveyed through Los Angeles County Sanitation District 20 (LACSD-20) at the Palmdale Water Reclamation Plant (PWRP).

The sites wastewater generation needs to be analyzed to verify if the proposed 6" sewer is sufficient to service the project development. The sewer analysis will be prepared following the city of Los Angeles County Zoning Coefficients, see Estimated Average Daily Sewage Flows of Various Occupancies Zoning Coefficients below.

The site currently exists as a vacant lot and will be developed in phases with the first phase encompassing the eastern half of the site, 2.54-acres bordering the 25th Street and E Avenue R. The second phase 2.95-acres bordered south by East Avenue R and east by the proposed commercial development will be a future commercial development.

II.ANALYSIS CRITERIA

Sewer system additions proposed for inclusion into LACSD-20 must be in accordance with the following criteria.

A. Average Daily Flows

Average Flow = $Q_{Average}$ is determined from the table below in Appendix B.
Average daily flows for Commercial areas are as follows:

Estimated Average Daily Sewage Flows of Various Occupancies Zoning Coefficients (LA County Sewer Area Study Guidance)

Zone	Coefficient (cfs/Acre)
Agriculture ----------	0.001
Residential*:	
R-1 ----------	0.004
R-2 ----------	0.008
R-3 ----------	0.012
R-4 ----------	0.016*
Commercial:	
C-1 through C-4 ----------	0.015*
Heavy Industrial:	
M-1 through M-4 ----------	0.021*

*Individual building, commercial or industrial plant capacities shall be the determining factor when they exceed the coefficient shown.
*Use 0.001 (cfs/unit) for condominiums only.

B. Design Flows

Design Flow to be determined using the current city design criteria.

Design Flow = Q_{Design} = 3($Q_{Average}$)

III.Sewer Pipe Sizing

Pipe sizing for gravity mains shall be determined on the basis of the design flow rate using the "Manning" formula with the following criteria:

Formula – Capacity of all sewers shall be determined by the use of the "Manning" formula:

$$Q = A\frac{1.486}{n}\, r^{\frac{2}{3}} s^{\frac{1}{2}}$$

Where:
Q = flow capacity, CFS
A = cross-sectional area, ft^2
n = coefficient of roughness
r = hydraulic radius, ft
s = slope

Palmdale Sewer Master Plan:

For pipes less than 15":

Pipe shall be designed to flow at 0.5D or less at design flow

Pipe design velocity shall be between 2 ft/s to 10 ft/s
Assumed Manning's coefficient of 0.013 for proposed pipes
Minimum Pipe slope is 0.4%

For pipes greater than 15":
Pipe designed to flow at .75D at design flow.
Pipe's design velocity shall be between 2 ft/s to 10 ft/s
Assumed Manning's coefficient of 0.013 for proposed pipes
Minimum slope for 15" and larger is 0.08%

IV.SEWER ANALYSIS

DEMAND:

Land use tributary areas:

Average Demand Flow found by taken the product of Land Use Tributary Area a Unit Flow over Unit Area.

$$Average\ Demand\ Flow\ = Tributa\ Area \times \frac{Unit\ Flow}{Unit\ Area}$$

Example: Service Station Average Demand Flow

$$Average\ Demand\ Flow\ = 7{,}350\ Ft^2 \times \frac{100\ GPD}{1{,}000\ Ft^2} = 735\ GPD$$

Average Demand Flows		
Land Use	**Area (Acre)**	**Average Flows (cfs)**
Commercial	2.54	0.0381
Commercial	2.95	0.0443

Node ID	Description	Average Flow (cfs)	Peak Average Flow (cfs)
Clean-out	Commercial	0.0381	0.11430
MH-1	Future Commercial	0.0443	0.13275
MH-2	Commercial & Residential	0.0824	0.24705
	to existing	0.0824	0.24705
	Total	0.2471	0.74115

Average Flow

	US MH No.	DS MH No.	Length (ft)	Pipe Dia. (in)	Max Slope (ft/ft)	Total Ave (cfs)	(AR^2/3)/ D^8/3	Angle (Radian)	Ave Velocity (ft/s)	Ave d/D
Commercial	Clean-out	POC	115	6	0.0250	0.0381	0.01339	1.54	2.3	0.1412
Future Commercial	MH-01	POC	217	8	0.0050	0.0443	0.01614	1.42	1.8	0.1208
Residential & Commercial	POC	MH-02	51	8	0.0100	0.0824	0.02124	1.73	2.0	0.1766

CAPACITY:

Site Proposed Main Line		
Size (in)	**Radius (ft)**	**Diameter (ft)**
6	0.25	0.5
8	0.33	0.67

Design Flow

	US MH No.	DS MH No.	Length (ft)	Pipe Dia. (in)	Max Slope (ft/ft)	Total Peak (cfs)	(AR^2/3)/ D^8/3	Angle (Radian)	Peak Velocity (ft/s)	Peak d/D
Commercial	Clean-out	POC	115	6	0.0250	0.11430	0.04016	2.06	3.1	0.2424
Residential	Residential	POC	217	8	0.0050	0.13275	0.04842	2.04	2.1	0.2383
Residential & Commercial	POC	MH-02	51	8	0.0100	0.24705	0.06372	2.35	2.7	0.3065

V.CONCLUSION

In summary, the site's predicted Demand for the designed 8" pipe's & 6" pipe gives the following results:

Velocity and flow depth:

The site has an Average and Peak (Design) Flow velocity of 2.0 and 2.7 ft/s respectively. The Flow depth ratio (d/D ratio) for average and peak flow exiting the site is 0.1766 and 0.3065 respectively. These values fulfill the design criteria for the Velocity and depth-to-pipe-diameter ratio.

Sewage Flow:

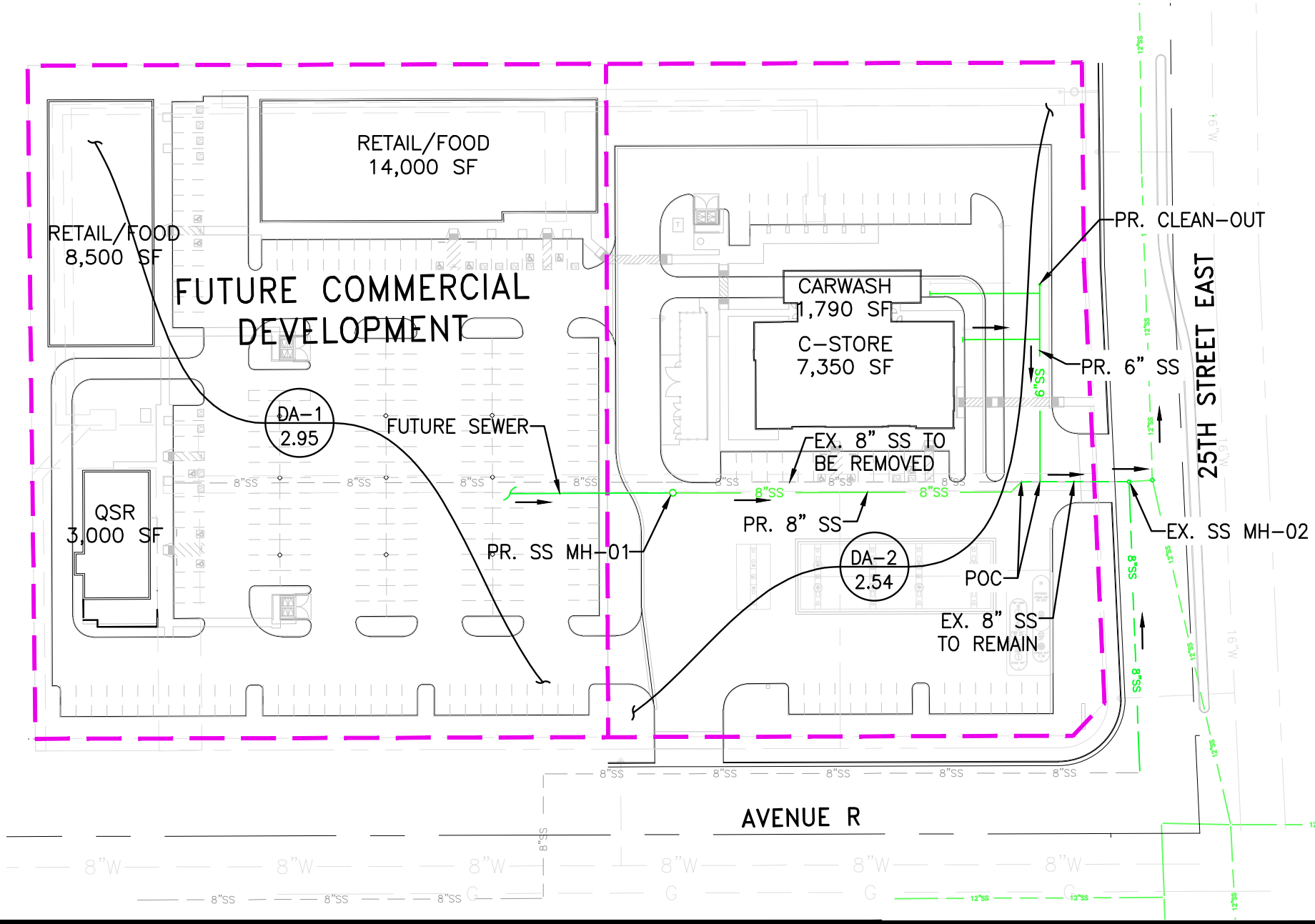
The 6" pipe's Average and Peak (design) flow is 0.01339 cfs at a 0.1412 d/D ratio and 0.1143 cfs at a 0.2424 d/D ratio respectively. The 8" pipe's Average and Peak (design) flow is 0.0443 cfs at a 0.1208 d/D ratio and 0.04842 cfs at a 0.2383 d/D ratio respectively. Per the Los Angeles County Sanitation District standards, average and design flow is allowed to flow up to 0.5 d/D ratio (see page 3). From this we can conclude that the proposed 8" sewer pipe is sufficient for the site's demand.

APPENDIX A – VICINITY MAP



VICINITY MAP

APPENDIX B – SEWER KEY MAP



0 80 160 Feet

1"=80'

SEWER KEYMAP
FOR
PALMDALE BEYOND MART
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