TECHNICAL SEWER STUDY REPORT

FOR

676 MOSS STREET

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Prepared by:

Michael Baker INTERNATIONAL

9755 Clairemont Mesa Blvd
San Diego, CA 92124
858.614.5000 Telephone
858.614.5001 Fax

Project Contact:

Joel E. Bowdan III, PE, RCE 71693
Aharon Weintraub, EIT

Signature

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Date

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Section 1 - Introduction

This report will provide background data, hydraulic analysis and a summary of the results as part of a sewer study for the proposed 676 Moss Street project. The purpose of this study is to identify the potential offsite and onsite impacts of the proposed project on the existing public sewer system. This sewer study will also verify the new private onsite sanitary sewer infrastructure design with a new sewer lift station.

Section 2 - Project Description

2.1 Project Location

The proposed project area is located within in the City of Chula Vista, California. It is located east of the San Diego Freeway (Interstate 5), south of L Street, north of Moss Street, and west of Broadway. The project area, as shown in Figure 2-1, is a 6.9-acre (ac) lot located just north of Moss Street and east of Industrial Boulevard.

Figure 2-1
Project Site (Google Earth)

2.2 Proposed Project

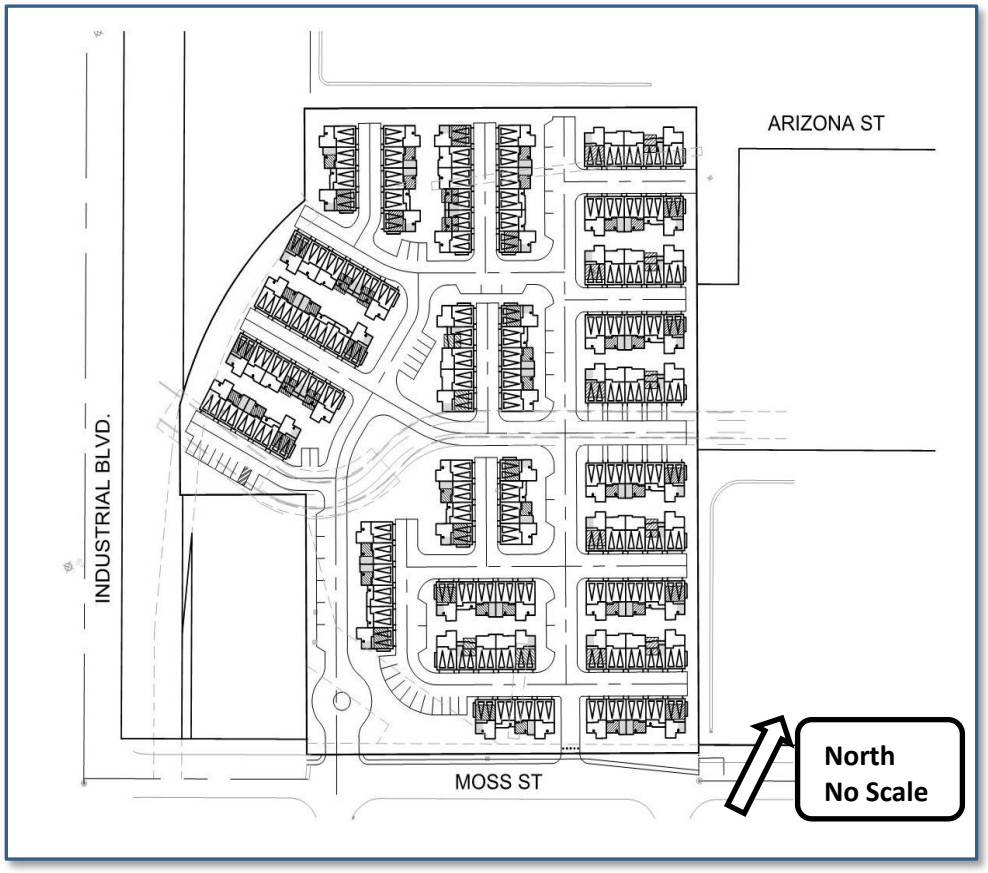
Shopoff Realty Investments proposes development of a new townhome condominium complex on a 6.9-acre site located near the northeast intersection of Moss Street and Industrial Boulevard (County Assessor Parcel Numbers 618-010-26, 618-010-31, and 618-010-32). Project frontage and site access will be directly

from Moss Street. The project proposes the construction of 141 two to three-bedroom condominium units across 18, three story, 45-foot tall buildings. The project proposes a density of 22.4 dwelling units per acre, with parking spaces, green space area, and pedestrian improvements along Moss Street. The proposed site layout is shown in Figure 2-2.

This project would involve the demolition of all existing structures and the complete grading of the site. A General Plan amendment and rezone is proposed to convert the use from limited industrial to high-density residential.

The existing property has been historically used for industrial purposes, specifically, industrial repair, fabrication, and salvage. It is currently occupied by five businesses.

Figure 2-2
Proposed Site Layout



2.3 Study Area

The study area is bounded by Moss Street to the South, L Street to the North, Industrial Boulevard to the West and Broadway to the East. The existing sewer mains surrounding the study area include a 12-inch

Polyvinyl Chloride (PVC) on Moss Street, 15-inch Vitrified Clay pipe (VCP) on Industrial Boulevard and an 8-inch VCP on Arizona Street.

Bisecting the project site are two (2) side-by-side 12-foot by 10-foot reinforced concrete box (RCB) storm drain culverts. Due to the double-RCB drainage culvert, the gravity collection system must be split into Norther Collection System and a Southern Collection System.

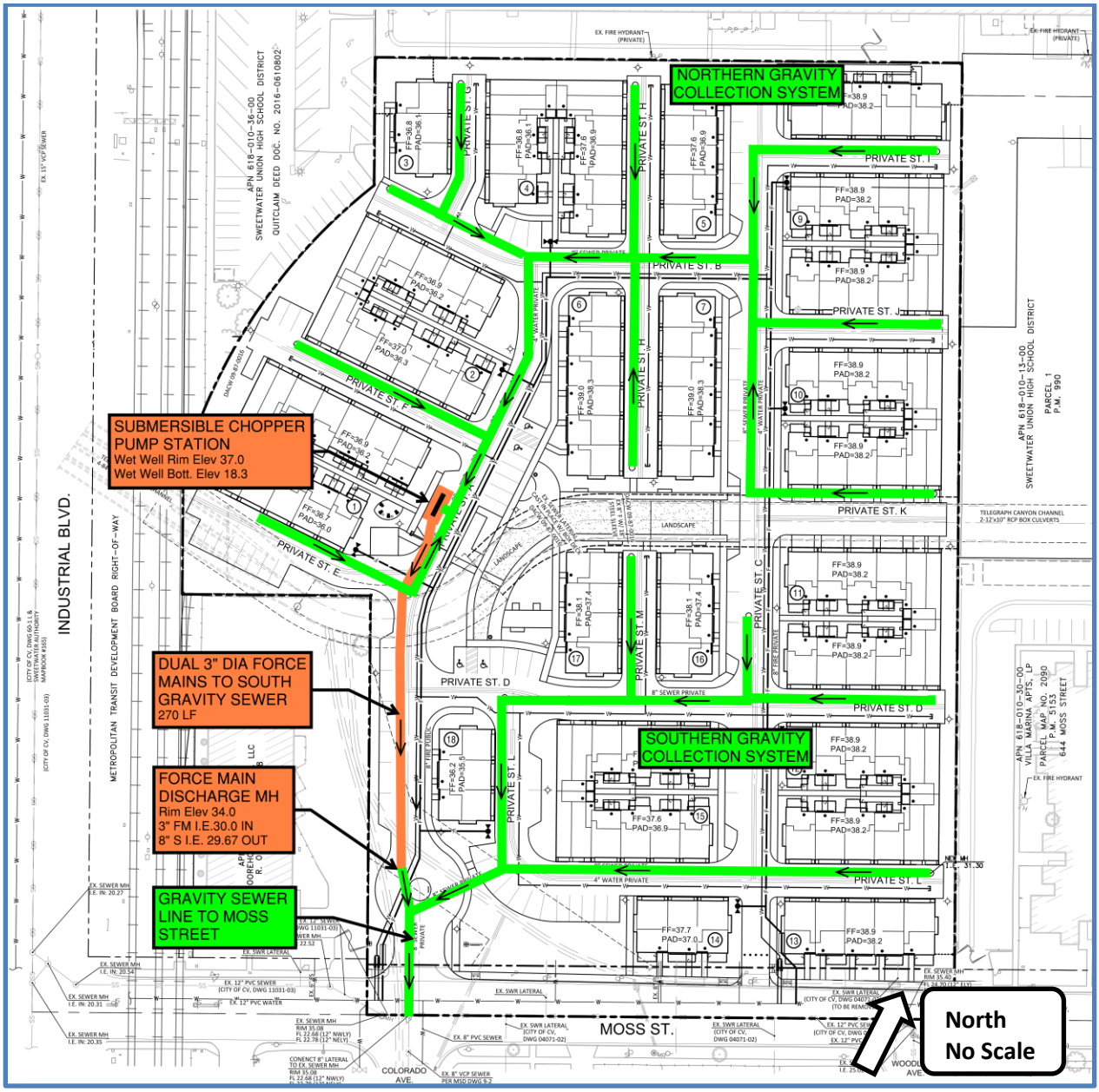
2.4 Proposed Points of Connection

The proposed onsite private sanitary collection system will be comprised of two (2) 8-inch PVC gravity sewer pipe networks. The onsite sewer system will be divided into north and south halves, separated by Private Street K due the bisecting double-RCB drainage culvert. The sanitary flow generated from the 55 units south of Private Street K will be transported to the existing 12-inch PVC sewer along Moss Street approximately 250-feet east of the intersection.

Sanitary flow generated from the 86 condominium units located in the northern development was originally conceived to be conveyed to the existing 15-inch VCP sewer main along Industrial Boulevard. However, this proposed proved to be infeasible as explained in the Feasibility Study. Furthermore, Michael Baker reviewed the existing 8-inch sewer on Arizona Street that dead ends approximately 500-feet east from the north east corner of the project site. This sewer was initially investigated and determined infeasible for the northern development connection due to differences in elevation and the site sloping southwesterly. The lowest pad elevations at the northern portion of the project site are at approximately 36.0 feet. With a minimum sewer depth of cover of 6 feet, the starting sewer invert elevation at the southwestern corner of the proposed northern collection system would be 30.0 feet. Per sheet two on as-built drawing 92-315, the invert elevation at the 8-inch sewer end cap on Arizona Street is 33.0 feet. For the purpose of conservatively determining the approximate vertical fall of the proposed sewer from the start to alternative points of connection, this study assumes an 8-inch pipe slope of 1.0-percent. At a linear pipe distance of 1,200 feet and a pipe slope of 1.0-percent from the western end of the northern project site to the Arizona Street 8-inch sewer end cap, the calculated invert elevation of the proposed sewer at the point of connection would be approximately 18.0 feet which is 15-feet below the existing sewer invert. Therefore, connecting to the existing Arizona St sewer is not a feasible alternative.

Since all gravity solutions have been vetted and proven to be infeasible, the collection system north of Private Street K will be served by a private sewer pump station which will be designed in accordance with Section 3-304 Private Pump Stations in the Subdivision Manual. Additional details of the proposed private sewer pump station are provided in Section 4 of this Technical Sewer Study Report. The proposed points of connection for the north and south sewer systems are shown in Figure 2-3. An exhibit showing the existing public sanitary collection system in Industrial Boulevard and Moss Street along with the proposed north and south private condominium sanitary collection systems is located in Appendix A.

Figure 2-3
Point of Connection Location Map



Section 3 - Sewer Flows

Wastewater flows are developed to estimate potential sanitary flow generation within the proposed development. These flows are calculated and assessed under Average Dry Weather Flow (ADWF), Peak Dry Weather Flow (PDWF), and Peak Wet Weather Flow (PWWF) conditions. Existing and future wastewater flows for the proposed project were developed per the Wastewater Collection System Master Plan (Master Plan), finalized in May 2014, for the City of Chula Vista.

The existing ADWF for the current land use was calculated using Table 3-2 in the Master Plan which provides recommended wastewater duty factors based on the 2009-2011 water demands. The existing project site Land Code designation is I – Industrial Limited, with a wastewater generation rate of 712 gpd/acre. The project site area is 6.9 acres. Multiplying the wastewater generation rate by the project site area provides a calculated ADWF generation rate of 4,913 gpd for the current site.

Proposed wastewater flows were calculated based on Table 3-3 in the Master Plan which provides multiple land uses wastewater generation rates to be used for future ADWF projections. The proposed project site land use designation will be RH-Residential High with a wastewater generation rate of 182 gallons per day per dwelling unit (gpd/DU), unit wastewater generation of 55 gallons/capita-day (gpcd), and a dwelling unit density of 22.5 dwelling units per gross acre. Using a wastewater generation rate of 182 gpd/DU from the Master Plan and multiplying by the proposed total number of dwelling units, the calculated ADWF is 25,662 gpd (0.04 cfs).

Peak Dry Weather Flow (PDWF) represents the highest flow that will occur over one day based on an ADWF. To develop the PDWF for the proposed development and current land use, the ADWF to PDWF peaking factor of 1.38 was taken from Figure 3-4 of the Master Plan resulting in a calculated PDWF of 35,414 gpm (0.055 cfs) and 6,780 gpd, respectively.

The average wet weather peaking factor calculated per Section 3.3.6 of the Master Plan is 1.85. This factor when multiplied against the PDWF results in a calculated Peak Wet Weather Flow (PWWF) for the proposed development of 65,515 gpd (0.101 cfs), and 12,543 gpd for the current land use.

As discussed in Section 2.4, the new onsite sanitary sewer system will be separated into the northern and southern systems. The northern system will flow by gravity to a new private sewer pump station which will be designed in accordance with Section 3-304 Private Pump Stations in the Subdivision Manual. The southern system will flow by gravity via an onsite gravity sewer system to a point of connection to the existing 12-inch Moss Street public sewer main. Pumped flow from the private sewer pump station in the northern system will be conveyed via forcemain to the private gravity sewer in the southern system. The ADWF, PDWF, and PWWF sewer flow calculations for the north and south collection systems are provided in Table 3-1 and Table 3-2, respectively. The total ADWF, PDWF, and PWWF sewer flows of the combined northern and southern collection systems toward the Moss Street connection point are summarized in Table 3-3. Additional details of the proposed private sewer pump station are provided in Section 4 of this Technical Sewer Study Report.

Table 3-1
Northern Collection System Sewer Generation to Private Sewer Pump Station

Number of Dwelling Units	86	units		
Sewer Demand Rate	182	gpd/DU		
ADWF	**15,652**	**gpd**	**10.9**	**gpm**
PDWF	**21,600**	**gpd**	**15.0**	**gpm**
PWWF	**39,960**	**gpd**	**27.7**	**gpm**

Table 3-2
Southern Collection System Sewer Generation

Number of Dwelling Units	55	units		
Sewer Demand Rate	182	gpd/DU		
ADWF	**10,010**	**gpd**	**7.0**	**gpm**
PDWF	**13,814**	**gpd**	**9.6**	**gpm**
PWWF	**25,556**	**gpd**	**17.7**	**gpm**

Table 3-3
Northern and Southern Collection System Sewer Generation to Moss Street

Number of Dwelling Units	141	units		
Sewer Demand Rate	182	gpd/DU		
ADWF	**25,662**	**gpd**	**17.8**	**gpm**
PDWF	**35,414**	**gpd**	**24.6**	**gpm**
PWWF	**65,515**	**gpd**	**45.5**	**gpm**

Section 4 - Sewer Pump Station

This section discusses the proposed private sewer pump station. Figure 2-3 in Section 2 shows the approximate location of the sewer pump station. Table 3-1 in Section 3 quantified the ADWF and PWWF in the Northern Collection System as 10.9 gpm and 27.7 gpm, respectively, to the sewer pump station. Due to the tight site constraints and the relatively low ADWF and PWWF, the private sewer pump station is proposed as a submersible duplex grinder or chopper type with pumps contained in a cast-in-place concrete wet well and valves contained in an adjacent integral cast-in-place concrete valve chamber. The pump station is planned to be located in an accessible area adjacent to west curb on Private Street A, between Private Streets E and F. As a result of the location and potential vehicular loading, the facility will require a monolithic concrete top slab with heavy-duty hinged and spring assisted lockable access hatches. A conceptual site plan, pump station plan, and sectional view of the pump station are provided in Figure 4-1 at the end of this Section 4.

Preliminary calculations (see Appendix D) were prepared to determine wet well volume requirements, generate a system curve, and provide preliminary pump selections. Based on those preliminary calculations, coupled with the **City of Chula Vista Subdivision Manual, Section 3-300, Article 3-304 Private Pump Stations (see Appendix C)**, and industry standard municipal design practice for sanitary pumping facilities, the following additional information is provided:

1. Emergency storage is calculated based on the ultimate average flow that is tributary to the pump station (refer to Subdivision Manual Section 3-300, Article 3-304). Based on an ADWF of 10.9 gpm, and an emergency storage requirement of 8 hours at average flow, an emergency storage volume of about 5,220 gallons is required. The proposed pump station wet well will be cast-in-place concrete structure with an inside plan dimension of 6-feet wide by 12-feet length with a storage height (distance from pump stop to maximum allowable storage level) of 9.7 feet. The deeper operating volume of the wet well will utilize smaller inside plan dimensions of 6-feet width by 6-feet length with a depth of 5 feet below the bottom of the larger emergency storage portion of the wet well. The submersible pumps will be located in the deeper, smaller portion of the wet well. During normal operation, the pump control levels will remain within the deeper portion of the wet well. In the event of power loss or complete pump system failure, the rising level will enter the larger (emergency) portion of the wet well. The floor of the larger portion of the wet well will be sloped at approximately 1.00-percent toward the smaller deeper wet well section to facilitate maintenance cleaning following an emergency storage event. The interior of the wet well structure will be lined with T-lock liner or similar internal protection.

2. Based on the PWWF of 27.7 gpm, and the anticipated use of 3-inch diameter forcemain, a pump capacity of about 80-100 gpm will be necessary. The minimum practical flow rate for a 4-inch pump with 3-inch solids handling capability is 125 gpm which is too large for this application. Therefore, a smaller chopper style submersible pump system will be utilized which allows use of smaller diameter forcemain. At 80-100 gpm design pump capacity, a nominal 3-inch diameter forcemain (acceptable for use with grinder and chopper style pumps) will have an acceptable

cleansing velocity of about 4.5 ft/s and result in a total dynamic head of about 25.4 feet. Preliminary pump selection based on the Xylem/Flygt FP3069 series submersible chopper pump (see Appendix E), or equal Hydromatic or ABS manufactured pump, in a duplex installation with spark-proof guiderail removal system is proposed for this application. Pumps will operate in a lead-standby arrangement. In this arrangement, the lead pump (pump 1 or pump 2, depending on control alternation) will operate, while the lag or second pump will only start in the event of high level or restart from loss of power

3. . Pump motors will be explosion-proof rated, 2.7 hp, 3255 rpm, and will be suitable for operation on a 208V/3pH/60hz or 240V/480V/3ph/60hz electrical service.

4. An adjacent 6-feet wide by 6-feet length cast-in-place valve chamber will house the swing check and plug isolation valves for each pump discharge. Each pump discharge will be equipped with pressure gauges and sanitary style gauge isolator suitable for sewage service.

5. A monolithic cast-in-place reinforced concrete top slab will be design for HS-20 loads and repeated vehicular traffic. The wet well and valve chamber hatches will be heavy-duty airport rated ductile iron with stainless steel hinge and spring lift assist hardware. Hatches will have waterproof gaskets and be lockable.

6. The level control system is anticipated to be float based or level transducer primary level sensors with float based secondary sensors for redundancy. Floats and/or level transducers will be wired to a microprocessor based control system. The control system will be capable of monitoring pump station operation and alarms and communicating alarms via alarm dialer or cell-based SCADA to 24/7 response personnel.

7. Pump electrical equipment, breakers, motor starters, level controller and alarm system will be installed above ground in a low profile NEMA 4 steel epoxy-coated or NEMA 4X stainless steel, lockable, weather-proof, and vandal-proof electrical enclosure. The enclosure will also house an automatic transfer switch. A natural gas-driven emergency generator with a hospital grade critical silencer and quiet package will also be located above grade to provide a redundant emergency power source in case of electrical utility service outage. All electrical equipment will be designed to meet UL and NEC/CEC requirements including meeting Class I, Division I, Group C/D requirements.

8. The private sewer pump station will be equipped with dual forcemains for redundancy. The forcemains will be routed southerly from the pump station over the double RCB drainage culvert approximately 290 lineal feet to the receiving manhole on the onsite private southern collection system. From this location the combined flows from the northern and southern sanitary collection systems will flow by gravity to the point of connection in Moss Street.

Estimated capital cost for this small private sewer pump station designed to meet municipal/industrial level quality including noted redundancies, emergency storage and power, and control system with

dialer/SCADA capability, is about $300,000. Annual operation and maintenance (O&M) costs (including electrical utility cost) are estimated as follows:

Maintenance, Operation, Cleaning, and Parts Replacement	= $5,000
Annual Cost of 25-year Pump and Control Replacement	= $1,800
Electrical Utility: 2,170 hrs*3hp*0.746 kW/hp*$0.26/kW-hr	= $1,263
Subtotal Annual O&M Cost	= $8,063
Contingency (10%)	= $ 806
Total Annual O&M Cost	**= $8,869**

The total annual O&M costs above represent the anticipated cost for the first year. Total annual O&M costs in subsequent years can be expected to increase at the rate of inflation (1% to 3% per year).

Figure 4-1
Conceptual Pump Station Plan and Section

Section 5 - Hydraulic Analysis

A desktop hydraulic analysis was performed for both the on-site sewer collection systems and the off-site downstream pipelines that convey flow from the project site through Chula Vista. All on-site calculated PWWF flow rates were obtained from Section 3 and used to determine the depth to diameter ratio (d/D) for the proposed sewer discharge just before the POC to the offsite sewer system. The d/D was only calculated at these locations as they represent the points of highest flow and thus highest d/D since the pipe slopes are uniform at 1.0-percent. Off-site public sewer analysis utilized the Master Plan to obtain flow rates in the existing sewers on Moss Street and Industrial Blvd for year 2050.

As discussed in Section 2.4, the on-site sewer system will be divided into separate Northern and Southern systems. The Southern system will connect to the existing sanitary sewer in Moss Street. The Northern system will convey sanitary flows to the proposed sewer pump station which will pump flows to a gravity connection at the Southern system. The Northern and Southern system will ultimately discharge by gravity via an 8-inch sewer that will connect both systems to the proposed point of connection at Moss Street. The Sanitary Sewer Exhibit in Appendix A shows the proposed pad elevations for the development and inverts of the existing sewer on Moss St along with the proposed sewer system connection's invert elevations. To determine the available slope, the difference in elevation from the sewer invert at the furthest point for each collection system to the invert at the existing sewer POC was calculated. Table 5-1 summarizes the available sewer slope and elevations for the southern sewer system to Moss St.

Table 5-1 Moss Street Sewer Slope Calculations

Proposed 8" Sewer Length	580	lf
Furthest Site Invert Elevation	33.2	ft
Moss St POC Invert Elevation	**22.7**	**ft**
Expected Elevation Drop	**10.5**	**ft**
Slope	**0.018**	**ft/ft**

Table 5-1 identifies an available slope of 1.8 percent in the proposed on-site sewer system toward Moss Street. The d/D in the proposed on site sewer system was calculated using Bentley FlowMaster V8i. This software uses Manning's Equation to calculate the d/D based on slope, discharge flowrate, pipe diameter, and roughness coefficient. For this calculation, a PWWF of 45.5 gpm (0.101 cfs), pipe diameter of 8-inches, Manning's roughness coefficient of 0.013, and the respective slope calculated in Table 5-1 were used to calculate to normal depth and d/D. Based on the results shown in Table 5-2, the proposed onsite private sewer meets the gravity main design criteria in section 4.1.1 of the Master Plan.

Table 5-2 On-Site Sewer PWWF d/D

Moss St 8" POC PWWF Discharge	0.101	cfs
Moss St 8" POC Calc. Velocity	**2.81**	**ft/s**
Moss St 8" POC Calc. Normal Depth	**1.28**	**inch**
Moss St 8" POC Calc. d/D	**0.16**	**unitless**

Michael Baker calculated the normal depth and resulting d/D in the public sewer mains downstream of the project site under 2050 PWWF flow rates using the hydraulic pipe characteristics and flow date from the 2014 WWMP Appendix. Pipe ID 4607 in the 2014 WWMP represents the Moss Street sewer which is planned to be upsized from 10-inch to 18-inch diameter to meet 2050 sanitary flows. Pipe ID 4608 represents the Industrial Boulevard sewer which is planned to be upsized from 15-inch to 18-inch diameter to meet 2050 sanitary flows.

Table 5-3 summarizes the hydraulic characteristics of the Moss Street and Industrial Boulevard sewer mains excluding the flow increase from the proposed Project. The calculated normal depth and d/D values shown in Table 5-3 are based on free flow and assume development of a normalized flow profile within the respective sewer reach. Under 2050 PWWF conditions with planned pipeline upsizing in place, the free flow d/D values in the Moss Street and Industrial Boulevard sewers are calculated to 0.34 and 0.58, respectively.

Table 5-3 Free Flow Calculations Using 2014 WWMP Sewer Hydraulic Data (2050)

Pipe ID	Location	Replacement Dia (in)	Slope (ft/ft)	2050 PWWF (gpm)	Calculated Normal Depth (in)	Calculated 2050 PWWF d/D
4607	Moss St	18	0.001	405.6	6.12	0.34
4608	Industrial Blvd	18	0.003	1,688.5	10.44	0.58

Note: Normal depth and depth/diameter (d/D) ratios calculated above are based on free flow calculations and do not include the influence of backwater.

Table 5-4 shows the calculated incremental increase in the free flow d/D due to the addition of flow from the proposed Project. The incremental increase in d/D is calculated as 0.02 in both the Moss Street and Industrial Boulevard sewers resulting in new free flow calculated d/D values of 0.36 and 0.60, respectively.

Table 5-4 Impact of Proposed Project Flows to d/D (2050) Free Flow Calculations

Pipe ID	Location	Original 2050 PWWF (gpm)	Projected 2050 PWWF (gpm)	Original 2050 PWWF d/D	New 2050 PWWF d/D	Incremental Increase in d/D
4607	Moss St	405.6	451.1	0.34	0.36	0.02
4608	Industrial Blvd	1,688.5	1,734.0	0.58	0.60	0.02

Note: * Depth/diameter (d/D) ratios calculated above are based on free flow calculations of the normal depth and do not include the influence of backwater.

Table 5-5 summarizes the hydraulic characteristics of the Moss Street and Industrial Boulevard sewer mains as provided in the 2014 WWMP. The 2014 WWMP 2050 PWWF modeled d/D values in Table 5-5 are higher than the free flow calculated d/D values in Table 5-3. The higher modeled d/D values from the 2014 WWMP suggest that the Industrial Boulevard and Moss Street sewer mains may be influenced by a backwater induced flow profile in the downstream sewers. The cause of the backwater influence is unknown and cannot be determined without use of the original hydraulic model used in the 2014 WWMP.

Table 5-5 Sewer Hydraulic Data (2050) from 2014 WWMP

Pipe ID	Location	Replacement Dia (in)	Slope (ft/ft)	2050 PWWF (gpm)	2050 PWWF d/D
4607	Moss St	18	0.001	405.6	0.439*
4608	Industrial Blvd	18	0.003	1,688.5	0.646*

Note: * Depth/diameter (d/D) ratios listed above are directly from the 2014 WWMP and may be influenced by backwater.

In light of the foregoing modeled results from the 2014 WWMP, Michael Baker used the incremental increase in free flow d/D provided in Table 5-4 and applied the increase to the 2014 WWMP modeled d/D values from Table 5-5. Table 5-6 shows the final estimated incremental increase in d/D due to flows from the proposed Project based on the backwater induced profile. Accordingly, the new estimated d/D values in the Moss Street and Industrial Boulevard sewer mains are 0.45 and 0.66, respectively, based on the projected 2050 PWWF with contribution flows from the proposed Project. The d/D values from Table 5-6 are less than the 3/4 full sewer design criteria according to Section 3-301.2 (2) of the City of Chula Vista Subdivision Manual.

Table 5-6 Impact of Proposed Project Flows to 2014 WWMP d/D (2050)

Pipe ID	Location	Original Projected 2050 PWWF (gpm)	New Projected 2050 PWWF (gpm)	Original 2050 PWWF d/D	New 2050 PWWF d/D
4607	Moss St	405.6	442.4	0.439*	0.45*
4608	Industrial Blvd	1,688.5	1,725.3	0.646*	0.66*

Note: * The Original Depth/diameter (d/D) ratios listed above are directly from the 2014 WWMP and may be influenced by backwater. Therefore, the new 2050 d/D ratios were calculated by adding the incremental

A secondary method of relating the existing and proposed flows was performed by calculating the percent increase in flows for the 2017 and 2050 flow conditions in the Industrial Blvd and Moss St sewers. Tables 4-5 and 4-6 provide a summary of relatable information for the comparison. The proposed project in comparison to the existing site is expected to increase flows to 2.18-percent and 1.95-percent in the 15-inch sewer on Industrial Blvd downstream from the project site for years 2017 and 2050 respectively. Due to the pumped flow from the northern system and gravity flow from the southern system, the proposed project will increase flows to the 12-inch sewer in Moss Street, by 9.05-percent and 6.72-percent for 2017 and 2050 respectively.

Table 5-7 Industrial Blvd Hydraulic Summary

Pipe ID	4608	
Diameter	15	in
Slope	0.003	ft/ft
2017 PWWF Master Plan Table 6-2	2,431,440	gpd
2050 PWWD Master Plan Appendix 2 2	2,722,964	gpd
Current Land Use PWWF	12,543	gpd
Proposed Development PWWF	65,515	gpd
Flow Increase (Proposed - Existing)	52,972	gpd
2017 Percent Increase	2.18	%
2050 Percent Increase	1.95	%

Table 5-8 Moss St Hydraulic Summary

Pipe ID	4607	
Diameter	12	in
Slope	0.011	ft/ft
2017 PWWF Master Plan Table 6-2	585,064	gpd
2050 PWWD Master Plan Appendix 2 2	787,962	gpd
Existing Development PWWF	12,543	gpd
Proposed Development PWWF	65,515	gpd
Flow Increase (Proposed - Existing)	52,972	gpd
2017 Percent Increase	9.05	%
2050 Percent Increase	6.72	%

Section 6 - Conclusions

Based on the discussions provided in Sections 2, 3, and 4 the following conclusions are provided:

1. Sizing – According to the Master Plan, the minimum size for a sewer pipe is eight-inches which will be sufficient to convey the estimated PWWF within each separate north and south private onsite sewer collection systems, and the combined pumped flow from the north system with gravity flow from the south system to Moss Street based on the hydraulic analysis performed in Section 4.

2. Gravity sewer connection from the north collection system to the City of Chula Vista public sewer in Industrial Boulevard or Arizona Street are not feasible. Therefore, this development proposes a private sewer lift station that will pump flows from the north collection system to the south gravity collection system for ultimate discharge to Moss Street. Capital costs for the construction of the private sewer pump station will be borne by the Developer. O&M costs will be initially borne by the Developer and later transferred to the HOA. (See Feasibility Report for additional information).

3. Design Considerations – The following design considerations must be followed during project design development of the sewer system:

    a. The project area must ensure separation both vertically and horizontally to meet the standards for separation between potable water and sanitary sewer utilities. Horizontal separation between parallel sewer and potable water main must be 10-feet from outside of pipe to outside of pipe. Minimum vertical separation requires that the bottom of potable water mains be at least 1-foot above the top of crossing sewer mains.

    b. Splitting the system into two systems, north and south, will aide in creating separation between the proposed sanitary sewer system and the existing double reinforced concrete box culvert storm drain which bisects the project area.

    c. The northern site will require permitting and coordination with ACOE to allow crossing of the proposed sewer pump station dual forcemains over the existing ACOE double box culvert.

4. Based on the comparison of 2050 original projected flows with the 2050 new projected flows, the 2050 d/D ratio increases are only incremental indicating that the Moss Street and Industrial Boulevard sewer mains, with 2050 replacement sewer sizes in place, have capacity to support the proposed Project.

5. The project's proposed onsite sewer collection system will be designed to convey the onsite generated sewer flows to the points of connection to the City of Chula Vista public sewer system. The onsite sewer system will be designed in accordance with the requirements of the City's

Subdivision Manual. A minimum pipe gradient of 1.00% is recommended for all onsite pipes to achieve self-cleansing velocities and/or minimum velocities of 2 fps or greater.

6. The Project's northern sanitary collection system will require a sewer pump station to convey sanitary flow to the southern collection system gravity sewer for ultimate discharge to the Moss Street sewer main. The proposed sewer pump station will be designed and constructed in accordance with the requirements of the Subdivision Manual section 3-304 Private Pump Stations.

Section 7 - Appendices

A. Sanitary Sewer Exhibit

B. City of Chula Vista Wastewater Collection System Master Plan (May 2014)

C. City of Chula Vista Subdivision Manual Section 3-300

D. Technical Study Sewer Generation and Pump Station Hydraulic Calculations

E. Catalog Data for Xylem/Flygt Model FP 3069 Pumps

APPENDIX A – SANITARY SEWER EXHIBIT

APPENDIX B – CITY OF CHULA VISTA WASTEWATER COLLECTION SYSTEM MASTER PLAN EXCERPTS (MAY 2014)

APPENDIX C – CITY OF CHULA VISTA SUBDIVISION MANUAL SECTION 3-300

APPENDIX D –TECHNICAL STUDY SEWER GENERATION AND PUMP STATION HYDRAULIC CALCULATIONS

APPENDIX E – CATALOG DATA FOR XYLEM/FLYGT MODEL FP3069 PUMPS