SANITARY SEWER STUDY REPORT

FOR THE

SOUTHWESTERN COLLEGE CAMPUS

JANUARY 11, 2016

Prepared by:

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Baker 149950

Table of Contents

Figure Index

Table Index

List of Acronyms

ADWF	Average Dry Weather Flow
Baker	Michael Baker International
gpd	Gallons per Day
gpdc	Gallons per Day per Capita
gpm	Gallons per Minute
mgd	Million Gallons per Day
PDWF	Peak Dry Weather Flow
PVC	Polyvinyl Chloride
SWC	Southwestern College
WWMP	Wastewater Master Plan

Section 1 - Introduction

This draft report provides background data, analysis, and a summary of results as part of a sanitary sewer system study for the Southwestern Community College campus. The purpose of this study is to analyze the existing sanitary sewer system conditions, develop theoretical sanitary flow rates for existing and proposed facilities, and compare the existing campus flow to the estimated average dry weather flows developed by the City of Chula Vista as part of their 2014 Wastewater Master Plan. Additionally, this draft report will be updated to provide the results of a sanitary flow study that will commence in January of 2016. The flow study will confirm actual current sanitary flows from Southwestern College and will allow updates to the theoretical factors used to estimate future sanitary flows from planned onsite improvements.

Section 2 - Project Description

2.1 Project Location:

The campus of Southwestern College (SWC) is located near the eastern portion of the City of Chula Vista, as shown below in Figure 2-1. Located within a residential community at the intersection of Otay Lakes Road and East H Street, SWC is a commuter school, averaging nearly 7,300 full-time equivalent students per semester. A Wastewater Master Plan was completed in 2014 for the City of Chula Vista to review and evaluate the city's current wastewater collections and

Figure 2-1
Project Site (Google Maps)

2.2 Study Area

The study area involves the current sanitary sewer infrastructure, including sanitary sewer laterals, mains, and lift stations which are contained within the SWC campus. The SWC campus is bounded by major corridors East H Street to the north, Otay Lakes Road to the east, and residential neighborhoods to the west and south. This existing sewer infrastructure will be reviewed to verify the capacity of the current SWC sewer mains, estimate existing and proposed onsite sanitary flows, and compare the estimated flows to the City of Chula Vista as part of their 2014 Wastewater Master Plan.

The City of Chula Vista Wastewater Collection System Master Plan (WWMP), completed May 2014, is a comprehensive study that provides capacity information for the entire City of Chula Vista wastewater collection system. The WWMP analyzes the existing public sewer system that serves the SWC and surrounding area. Specifically, the SWC campus is provided with two 8" PVC sanitary sewer connections. The first point of connection is located at Otay Lakes Road at Elmhurst Street and provides connection to the 10-inch public sanitary main which drains into the Telegraph Canyon Basin. The second point of connection occurs near the football stadium on the western side of the campus at East H Street to an 8-inch public sanitary sewer which drains into the Sweetwater Basin collection system.

2.3 Guidelines, Data, Exhibits, and Previous Study Reports

The following guidelines, data, exhibits and/or previous accepted sanitary sewer study reports were reviewed as part of the preparation of this sanitary sewer analysis:

- "City of Chula Vista Wastewater Collection System Master Plan" by Infrastructure Engineering Corporation
- "Southwestern Community College District Facilities Master Plan" by Cambridge West Parnership and HPI Architects
- Full-time Equivalent Students Enrollment Information from SWC Admissions
- City of Los Angeles Public and Commercial Facilities Average Daily Flow Projections
- "Southwestern Community College – Chula Vista Campus – Existing Sanitary Sewer Utility Survey" by NV5
- "Field House & Stadium Improvements" by RBF Consulting
- "Improvement Plans for Southwestern College Sewer Lift Station" by RBF Consulting
- "Public Improvement Plans for Southwestern College Corner Lot at Otay Lakes Road and H Street" by RBF Consulting
- "Improvement Plans for Southwestern College Wellness and Aquatic Center Project – Increment 1" by RBF Consulting

Section 3 - Existing Sanitary Sewer Analysis

3.1 SWC Sewer Layout

The existing sanitary sewer layout information was provided by NV5 and RBF Consulting, now Michael Baker International. Figure 3-1 and Figure 3-2 display an example section of this layout while the full campus sanitary sewer diagram can be found in Appendix A.

Figure 3-1
SWC Campus Sample Section of Sanitary Sewer diagram

The figure above is a small part of the sanitary sewer infrastructure for SWC campus. Nearly all flow from the SWC campus travels to the public sanitary sewer along Otay Lakes Road. The infrastructure is color coordinated according to pipe and structure: red lines represent existing sanitary sewer mains, cyan circles represent existing sewer manholes, and the yellow line represents the recently constructed sanitary force main designed by Michael Baker International that connects to the lift station outside Devore Football Stadium. The pastel green box hovering each existing building is the building number provided by the SWC Facilities Master Plan. Buildings are grouped within an opaque blue or green box and labeled. The labels indicate where the sanitary flow is deposited and correspond to either a sewer manhole or sanitary sewer pipe. An opaque blue box groups existing buildings that will not affect the current sanitary sewer infrastructure. The green boxes, however, groups existing buildings that will be removed or replaced, affecting the future sanitary sewer flow. The grouping is for the purpose of the sanitary sewer studies and will be further discussed in Section 4 of the report.

Figure 3-2
SWC Devore Stadium Section of Sanitary Sewer diagram

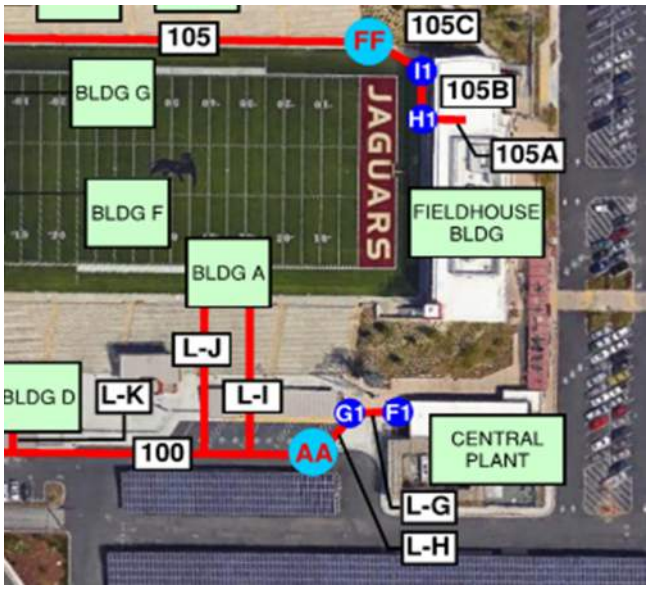

Figure 3-2 provides a small section of the sanitary sewer infrastructure surrounding Devore Football Stadium. The color coordinated layout description in the previous paragraph is applicable to this diagram. Sanitary flow from the stadium exits to the public sanitary system at East H Street or east of the SWC campus at Manhole E via sewer force main.

3.2 Sewage Generation Rates

3.2.1 Duty Factors

The Chula Vista WWMP provides sanitary sewer information for calculations and assumption within this study. According to the WWMP, wastewater average daily duty factors for various land uses were calculated using existing water billing records and estimated return-to-sewer-ratios. Based upon the information contained within the WWMP, SWC falls under the Junior/Middle/High School/Junior College classification with an estimated duty factor of approximately 13 gallons per day per capita (gpdc) where student populations are known or 1080 gpd/acre where parcel size is known.

3.2.2 SWC Student Population

The Admissions department of SWC provided full-time enrollment data over the last 5 years. Table 3-1 summarizes the total number of full-time equivalent students for both Spring and Fall semesters from 2011 to 2015. Based on the received enrollment data, an average number of 7,296 full-time students per semester was calculated.

Table 3-1
SWC Full-Time Enrolled Students

	2015		2014		2013		2012		2011	
	FALL	SPRING	FALL	SPRING	FALL	SPRING	FALL	SPRING	FALL	SPRING
Full Time Students	7,606	7,296	7,244	7,144	7,573	6,687	7,620	7,359	7,367	7,066
Total										**72,962**
Average No. Students per Semester										**7,296**

For this study, the sewer analysis will produce a daily sewage generation value. Although college students are not on campus all day or every day, the average number of students per semester represents the daily number of students on the SWC campus. Table 3-2 provides a sample calculation of the estimated sewer generation rate based off the number of students enrolled. The sewage calculation based off acres produces a significantly higher average daily flow compared to the student enrollment calculation and the expected sewer flow of 81,100 gpd from the City of Chula Vista WWMP that will be discussed later in this report. For this report, the student enrollment population and corresponding duty factor will be used for this report as it yields a smaller and more realistic flow value.

Table 3-2
Average Sewer Generation Calculation

	Students or Acres	Duty Factor	Total ADWF
City of Chula Vista WWMP	N/A	N/A	**81,100 gpd**
Student Enrollment Sewage Generation	7,296 students	13 gpd/capita	**94,858 gpd**
Sewage Calculation based off Acres	140 acres	1,080 gpd/acre	**151,200 gpd**

The daily student population was apportioned amongst the building sizes on the campus based on square footage and number of floors per building. Table 3-3 provides a sample calculation to demonstrate how the existing onsite average dry weather flow (ADWF) was determined per building in gallons per day (gpd) based off the student population and building sizes.

Table 3-3
Sewer Generation Rate Sample Calculation

Building 610 (Student Union) (25,846 sq. ft.)	=	4.7% of Total SWC Building Square Footage From NV5
No. Students per Bldg 610 (4.7% of 7,296 students)	=	343 Students
AVERAGE DRY WEATHER FLOW	=	Facility Qty * Duty Factor
	=	343 students * 13 gpd/capita
	=	**4,461 gpd or 0.0069 cfs**

A spreadsheet was created to estimate the total sanitary flow produced on campus. Based on the campus population and duty factors provided by the WWMP, SWC currently generates an estimated 94,800 gallons per day (gpd) of sewage. A detailed spreadsheet with all theoretical sanitary flow calculations can be found in Appendix B.

3.3 Devore Football Stadium

All SWC building sanitary generation rates were calculated as shown in Table 3-3, except for the Devore Football Stadium and surrounding facilities. Devore Stadium contributes to the sanitary system usually when a home game is scheduled. According to their 2015-2016 schedule, all SWC home games are held on Saturdays. Additionally, Bonita Vista High School, located 0.25 miles northeast of SWC, holds their Junior Varsity and Varsity football home games on Fridays at Devore Stadium during the season.

Devore Stadium has a seating capacity of 7,275. Attendance between high school and college football games differ greatly, and the stadium is not typically filled to maximum capacity. For this report, we have assumed that each college game attendance is 50% of the maximum seating capacity, 3,638 seats; and each varsity high school game attendance is 25% of the maximum capacity, 1,819 seats. Junior varsity team game attendance is generally negligible and is not included in this analysis. A duty factor of 4 gpd/attendee is utilized to determine the calculated average dry weather flow (ADWF) produced during each game[1] as shown in Table 3-4.

Table 3-4
Devore Football Stadium Sewer Generation Calculation per Home Game

	Attendance (seats)	Duty Factor	Total ADWF
College Football Game	3,638	4 gpd/seat	**14,550 gpd**
H.S. Varsity Football Game	1,819	4 gpd/seat	**7,275 gpd**

[1] Calvin College Engineering 2011, Stadium Academia (2012) http://www.calvin.edu/academic/engineering/2011-12-team9/Team09FinalReport.pdf

Both high school and college football seasons take place between the months of September to November. Five of the ten scheduled SWC football games in 2015 took place at home. Bonita Vista High School Varsity football was scheduled for 4 home games during regular season. This past season, two of the high school varsity division championship games were held at Devore Football Stadium. Furthermore it must be noted that these games occur during evening hours on Fridays and Saturdays when student population on campus is low. Since the home games occur at most once a week for either SWC or Bonita Vista High School, the ADWF calculations are determined differently than SWC. The total ADWF, calculated in Table 3-4, is multiplied by the number of home games per school to determine the average flow throughout one season. The flow per season is then divided over one year, 365 years, to produce an average daily value.

Similar to the SWC population apportioned per campus building, the total number of attendees for both football games is distributed amongst the available facilities in and surrounding Devore Stadium. The attendance and sewer flow for the stadium are excluded from the SWC student population and sewer flow and will be noted when it is included.

3.3.1 Central Plant

The Central Plant, located directly south of Devore Football Stadium adjacent to the south parking lot and Field House, supplies hot and chilled water to the SWC campus through a looped system. Table 3-5 analyzes the major flows to the sanitary sewer from the Central Plant. The estimates are based on the operation of the cooling towers at the assumed average load, 50%, and peak load, 80%.

Table 3-5
Central Plant Average and Peak Flows

Estimate of Flows	Average DWF (50%)	Peak DWF (80%)
Cooling Towers Blow-Down	1,100 gpd	1,800 gpd
Water Softeners Regeneration Waste	900 gpd	1,500 gpd
Total	**2,000 gpd**	**3,300 gpd**

The sanitary sewer flow calculations provide an estimate of the average daily sanitary flow for the campus and Devore Football Stadium. The total Central Plant average flows provided in Table 3-5 are included in the sewer flow spreadsheet located in Appendix B.

3.4 City of Chula Vista vs SWC

Actual wastewater generation for the City and various land uses were not provided in the WWMP. However, water billing data was utilized in the City's WWMP to estimate wastewater flows to the sewer. This data was averaged over a three year period from 2009-2011. SWC is listed in the WWMP as the twelfth major water consumer of the 82 major water users for the City of Chula Vista, accounting for an estimated 81,083 gpd of the city total 5.4 mgd. For the purpose of this report, the wastewater usage data will be assumed equivalent to the average water use data from 2009-2011.

Based on the average daily population on campus and using theoretical duty factor of 13 gpcd provided in the WWMP, SWC currently generates more sanitary flow than was originally estimated City of Chula Vista. Table 3-6 summarizes the current daily average sanitary sewer flow calculated for this report, found in Table 3-2, and the flow of 81,100 provided in the WWMP for SWC. These flows will be compared to the sanitary flow study that will commence in January 2016.

Table 3-6
Average Daily Sanitary Sewer Flow Summary

Sanitary Sewer Flow Source	Approximate Flow
City of Chula Vista WWMP	81,100 gpd
SWC Flow Study by Michael Baker (including Central Plant and Devore Stadium)	97,100 gpd
Average Daily Flow Difference	**16,000 gpd**

3.5 Existing Sanitary System Results

An excel spreadsheet was created to calculate the existing sanitary sewer flow through the SWC campus. Sanitary sewer manhole inverts, pipe lengths, and pipe sizes were provided by NV5, Michael Baker International, and the City of Chula Vista. This information was used to determine pipe slope and analyze the flow of each segment of pipe between manholes. Population per building was determined by the total square footage of all buildings and the total number of full-time enrolled students. This calculation, including ADWF, is provided in Table 3-3. The peak factor for dry weather flow (PFWD) was calculated using the assigned population and Ten States Standards, a peak factor formula centered on population. The peak factor is then multiplied by the ADWF to determine the peak dry weather flow (PDWF), the estimated flow during the greatest usage of the sanitary sewer system.

The City of Chula Vista's WWMP minimum velocity requirement is 2.0 ft/s. In reaches of upstream sewers having very light sewer loads, this results in very impractical and steep sewer slopes. To address this issue, Baker will reference use of the Water Environment Federation (WEF) Manual of Practice (MOP) FD-5. WEF MOP FD-5 addresses avoiding unnecessarily steep sewers having low sanitary loads by use of the "Tractive Force Design" method to determine the ability of a sewer to be self-cleaning. The Tractive Force method is used to design sewers to achieve self-cleaning ability based on calculation of critical shear stresses as recommended in WEF MOP FD-5 and ASCE MOP 60. Critical shear stress is determined from the following equation:

$$\tau c = 0.0181 * (Dp)^{0.277}$$

where: τc = critical shear stress, lb/ft^3

Dp = nominal diameter of design particle, mm (1.0 mm is typically recommended)

The self-cleansing velocity can then be determined for each reach of sewer based on the following equation:

$$v_{sc} = \left(\frac{1.486}{n}\right) R^{1/6} \left(\frac{\tau c}{\gamma}\right)^{1/2}$$

where: v_{sc} = self-cleansing velocity, ft/s
n = Manning's roughness coefficient
R = hydraulic radius, ft
τc = critical shear stress, lb/ft^2
γ = specific weight of water, lb/ft^3

The above equation is used in this flow study to calculate the cleansing-velocity of each reach of sewer. If the actual calculated velocity of the sewer reach (based on the flow, pipe slope and calculated d/D) is greater than the calculated cleansing velocity, then the designed sewer slope is considered adequate for the respective sewer reach.

The existing sanitary sewer calculations do not appear to have any issues or potential issues. All sanitary sewer surrounding Devore Football Stadium was designed by Michael Baker International. Main lines and laterals with adverse slopes will be addressed and verified, including all information highlighted in yellow. Main line 108, however, is a pressurized sewer pipe transmitting flow from a low to high elevation.

Section 4 - Proposed Sanitary Sewer Analysis

The purpose of this report is to analyze and develop theoretical flow rates for the existing sanitary sewer system for SWC. Recently, SWC completed construction on the new Devore Football Stadium and its surrounding support facilities which are included in this report. As the campus continues to expand, the existing sewer infrastructure must be able to meet future capacities for new buildings. Enrollment over the past five years have consistently ranged between 7,000 and 7,500 each semester annually. This report assumes that the average student population of 7,296 to remain stable in future years; however the number of full-time students, and thus the sanitary flows to be dispersed throughout the existing and new buildings may change as the campus facilities expand.

4.1 Projected Sanitary Flows

The proposed SWC campus buildings, as shown in Appendix A, include a new Wellness and Aquatic Center, located in the corner parking lot at the intersection of Otay Lakes Road and East H Street, a Performing Arts Center adjacent to the Wellness and Aquatic Center, and replacement Math and Science buildings, located in the southwestern portion of the campus near parking lot D. The sanitary flows projected for these facilities were determined by either population or square footage based on an average unit flow factor provided by the City of Los Angeles Public and Commercial Facilities table found in Appendix E. The Math/Science Auditorium and Wellness/Aquatic Center flow projects were calculated using the average unit flow factors which provide a specific unit per building or facility type. If the table did not provide a commensurate unit factor suitable for the facility type, then the average dry weather flow was estimated by population based apportioned from existing building square footage.

Sanitary sewer flow from the Performing Arts Center and Wellness and Aquatic Center are proposed to be conveyed to the recently constructed sanitary lift station located adjacent to Devore Football Stadium. The force main from the sanitary lift station conveys the pumped flow into the existing onsite private gravity sewer in Elmhurst which then flows by gravity into the public sewer main in Otay Lakes Road. The sanitary flow from proposed Math and Science Center will be conveyed to existing surrounding onsite gravity sewer mains which also discharge to the Otay Lakes Road connection. Table 4-1 summarizes the population, ADWF and PDWF for the existing and proposed SWC campus and SWC (All), including the Devore Football Stadium and the surrounding facilities. See Appendix D for a more detailed spreadsheet with existing and proposed facilities and daily flow. All existing facilities to be replaced have a population of zero in the proposed column to avoid double counting.

Table 4-1
Existing and Proposed Sanitary Sewer Flow

	POPULATION	ADWF (gpd)	PDWF (gpd)
Current SWC Campus based on enrollment (including Central Plant)	7,296	96,848	398,645
Proposed SWC Campus based on enrollment (including Central Plant)	8,984	118,787	479,499
Devore Stadium (off SWC peak use)	3,638	14,550	49,032

The population for the proposed SWC campus is slightly greater than the current SWC campus. Although the population is assumed to remain constant for the projected SWC campus additions, the average sanitary flow projections were calculated in respect to the existing building sizes and estimated population apportioned per building. The proposed facilities are designed to add more square footage per student, and therefore impact the total population.

Devore stadium was calculated separately and is not included in the population, ADWF, and PDWF of SWC and SWC Campus. Since the football games occur at night, about once a week, the peak would not occur at the same time as the campus peak. The population, ADWF, and PDWF of the Devore Stadium was determined by the estimated attendance of a SWC home football game, assuming the worst case scenario that all population will produce sewage simultaneously.

4.2 Projected Sewer System Result

The excel spreadsheet used to calculate and determine the proposed sanitary flows follow the same format as the existing sanitary sewer calculation spreadsheet. Branches L-S1 and L-S are the currently inactive pipes that will provide connection from the Performing Arts and Wellness and Aquatic Center to the existing lift station, accounting for approximately 27,000 gpd. Manhole I, Manhole J, and Mainline 3 will produce less flow as the existing math and science facilities will be relocated to the western side of the campus, thus increasing the flow entering Manhole K. Main line 12, the downstream pipe of Manhole K, will be able to accommodate the additional flow from the new Math and Science Center. This additional

flow from the Performing Arts Center, Wellness and Aquatic Center, and Math and Science Center increases the cumulative ADWF at and following all sanitary sewer at Manhole E. Main line 6a along Otay Lakes Road will have a calculated d/D of 0.50, a little less than the City's design requirement of 0.60 for existing 12" diameter pipes or smaller.

Section 5 - Conclusions

This sanitary sewer flow study was conducted to analyze the existing sewer system based on available sewer, wastewater master plans and asbuilts. The data provided by NV5 was used as the base for the existing sanitary sewer layout and provided the building area necessary to allocate sanitary flow. The resulting observations and calculations conclude that the average daily sanitary flow from SWC is higher than the flow accounted by the City. This conclusion is theoretical and will be updated upon receiving the sanitary sewer flow study results that will take place January 2016. Based on our information, we conclude the following:

1. Full-time enrollment for SWC has been consistent for the last five years. This trend is expected to continue following completion of the additional buildings for the SWC campus. For the purpose of this study, we have accounted for additional capacity due to increased square footage of new buildings.

2. High school and college football games take place twice a week from September to November. The total season average flow per college and high school game was distributed over a period of one year to obtain an average daily flow.

3. SWC produces more average dry weather flow than the City of Chula Vista has developed. These values will be further studied and evaluated upon receiving the results of the future sanitary sewer flow study.

4. The current sewer infrastructure accommodates both the existing and proposed sanitary sewer flow based off the provided information from NV5, Michael Baker International, and the City of Chula Vista. Most of the existing and proposed flow is within the design requirements based off our calculations and will be verified for the final sanitary sewer report.

Section 6 - Appendices

A. Southwestern College Sanitary Sewer Infrastructure Map

B. Existing Sanitary Sewer Study Summary

C. Projected Sanitary Sewer Study Summary

D. Existing and Projected Sewer Comparison

E. Average Unit Flow Projections


Otay Lakes Rd
PROPOSED PERFORMING ARTS AND WELLNESS & AQUATICS CENTER
PROPOSED MATH AND SCIENCE BUILDINGS
JAGUARS
BLDG A
BLDG D
BLDG F
BLDG G
BLDG H
BLDG J
FIELDHOUSE BLDG
CENTRAL PLANT
MH A
MH B
MH D
MH H
MH I
MH J
MH K
MH L
MH N
ML 1
ML 2
ML 3
ML 12
ML 14
Appendix A
LEGEND
SANITARY SEWER
SEWER FORCE MAIN
MANHOLE
CLEANOUT
LIFT STATION
ASSUMED LATERAL

Appendix B

Manning n: **0.013** (recommended design "n" is 0.013)
Design Particle Nom Dia (mm): **1.00**
Specific Wt of Water (lbs/ft^3) **62.40**

SOUTHWESTERN COLLEGE
EXISTING SANITARY SEWER STUDY SUMMARY
DATE: 1/11/2016

JOB NO: 149950 BY: SAR FOR: SOUTHWESTERN COLLEGE

Line	Length (ft)	From MH	From I.E.	To MH	To I.E.	Population (persons)	ADWF (gpd)	ADWF Cumulative (gpd)	Peaking Factor for DWF (PFDW)[2]	PDWF (gpd)	Peaking Factor for WWF (PFWW)[3]	Peak Wet Weather Flow (PWWF) (Design Flow) mgd	Peak Wet Weather Flow (PWWF) (Design Flow) cfs	Pipe Size Diameter (in)	Pipe Slope (%)	Full Pipe Flow (cfs)[4]	Q/Qfull[5]	Calculated d/D	Calculated Normal Depth (d_n)	Pipe Velocity (ft/s)	Min. Self Cleansing Velocity (ft/s)	Sewer Self Cleansing[3]	Remarks
Main Line																							
1	350.12	A	488.25	B	484.54	1455	18,916	18,916	3.69	69,783	1.00	0.07	0.11	8.00	1.06	1.24	0.087	0.19	1.52	2.34	1.27	Yes	Incoming flow from Branch L-4 and L-5 Incoming flow from Buildings 540, 550 & 560
2	351.23	B	484.64	C	483.80	1855	14,657	24,115	3.61	87,079	1.00	0.09	0.13	8.00	0.24	0.59	0.228	0.32	2.56	1.40	1.37	Yes	Flow from MH B split between ML 2 & ML 11 Incoming flow from Building 600 and Branch L-7
3	342.42	C	483.80	D	482.98	6641	62,213	86,328	3.13	270,089	1.00	0.27	0.42	8.00	0.24	0.59	0.707	0.62	4.96	1.84	1.47	Yes	Incoming flow from ML 9, ML 14, and Branch L-19&L-14
4	351.1	D	482.98	E	470.45	7296	8,520	94,848	3.09	293,005	1.00	0.29	0.45	8.00	3.57	2.28	0.199	0.30	2.40	5.15	1.36	Yes	Incoming flow from Branch L-15
5	134.9	E	470.45	F	465.55	7317	83	94,931	3.09	293,148	1.00	0.29	0.45	8.00	3.63	2.30	0.197	0.30	2.40	5.15	1.36	Yes	Incoming flow from ML 108
6	96.1	F	465.55	G	462.06	7317	-	94,931	3.09	293,148	1.00	0.29	0.45	8.00	3.63	2.30	0.197	0.30	2.40	5.15	1.36	Yes	
6a	403	G	462.06	G1	461.01	7317	-	94,931	3.09	293,148	1.00	0.29	0.45	10.00	0.26	1.12	0.406	0.44	4.40	1.96	1.48	Yes	
Main Line																							
7	161.1	H	496.05	I	491.31	640	8,320	8,320	3.92	32,588	1.00	0.03	0.05	4.00	2.94	0.33	0.155	0.26	1.04	2.80	1.18	Yes	Incoming flow from Buildings 400-480
8	249.5	I	491.31	J	488.22	532	5,507	6,914	3.96	27,380	1.00	0.03	0.04	8.00	1.24	1.34	0.032	0.12	0.96	1.79	1.18	Yes	Flow from MH I split between ML 8 & ML 10 Incoming flow from Branch L-8
9	354.7	J	488.22	C	483.80	869	4,377	11,291	3.84	43,341	1.00	0.04	0.07	8.00	1.25	1.35	0.050	0.15	1.20	2.04	1.22	Yes	Incoming flow from Buildings 300-340
Main Line																							
10	357.3	I	491.31	ML 2	484.41	760	9,875.38	9,875	3.87	38,255	1.00	0.04	0.06	8.00	1.93	1.68	0.035	0.12	0.96	2.49	1.18	Yes	Flow from MH I split between ML 8 & ML 10
Main Line																							
11	364.7	B	484.69	K	480.55	787	10,231	10,231	3.86	39,539	1.00	0.04	0.06	8.00	1.14	1.29	0.048	0.14	1.12	2.06	1.21	Yes	Flow from MH B split between ML 2 & ML 11
12	347.6	K	480.35	M	478.87	1818	13,409	23,640	3.62	85,518	1.00	0.09	0.13	8.00	0.43	0.79	0.168	0.27	2.16	1.74	1.34	Yes	Incoming flow from Branch L-10 and L-11 Incoming flow from Buildings 610 & 1505
Main Line																							
13	75.5	L	473.19	M	478.87	1068	13,887	13,887	3.78	52,513	1.00	0.05	0.08	8.00	-7.53	-	-	#N/A	#N/A	#N/A	#N/A	#N/A	Incoming flow from Branch L-12 and L-13
14	363.5	M	478.87	C	483.80	3105	26,474	40,361	3.43	138,428	1.00	0.14	0.21	8.00	-1.36	-	-	#N/A	#N/A	#N/A	#N/A	#N/A	Incoming flow from ML 12 and Bldgs 700&710 Flow deposits into MH C
Main Line																							
100	287.6	AA	468.90	BB	465.80	11	2,044	2,044	4.41	9,016	1.00	0.01	0.01	8.00	1.08	1.25	0.011	0.07	0.56	1.30	1.09	Yes	Incoming flow from Branch L-H, L-I, L-J, & L-K
101	104.2	BB	465.80	CC	453.50	11	-	2,044	4.41	9,016	1.00	0.01	0.01	8.00	11.80	4.15	0.003	0.04	0.32	2.98	0.99	Yes	
102	77.8	CC	453.50	DD	434.48	11	-	2,044	4.41	9,016	1.00	0.01	0.01	8.00	24.44	5.97	0.002	0.03	0.24	4.57	0.95	Yes	
L-B	23.5	DD	434.48	B1	434.32	11	-	2,044	4.41	9,016	1.00	0.01	0.01	6.00	0.68	0.46	0.030	0.11	0.66	1.19	1.11	Yes	
L-C	102.7	B1	434.32	C1	433.62	20	36	2,081	4.38	9,113	1.00	0.01	0.01	6.00	0.68	0.46	0.030	0.11	0.66	1.20	1.11	Yes	Incoming flow from Branch L-A (capped)
L-D	78.7	C1	433.62	D1	433.10	39	76	2,156	4.34	9,348	1.00	0.01	0.01	6.00	0.66	0.46	0.032	0.12	0.72	1.08	1.13	No	Incoming flow from ML L-Q
L-E	73.5	D1	433.10	E1	432.63	39	-	2,156	4.34	9,348	1.00	0.01	0.01	6.00	0.64	0.45	0.032	0.12	0.72	1.08	1.13	No	
L-F	39.3	E1	432.63	ML 113	429.40	39	-	2,156	4.34	9,348	1.00	0.01	0.01	6.00	8.22	1.61	0.009	0.06	0.36	3.01	1.01	Yes	Flow deposits into ML 113
Main Line																							
L-N1	36.3	BLDG J	458.60	J01	442.00	0	-	-	4.50	-	1.00	-	-	4.00	45.78	1.29	-	#N/A	#N/A	#N/A	#N/A	#N/A	
L-N	248.2	J01	442.00	J1	436.53	11	44	44	4.41	195	1.00	0.00	0.00	6.00	2.20	0.83	0.000	0.01	0.06	0.91	0.75	Yes	Incoming flow from Branches L-L & L-M
L-O	46.6	J1	436.53	K1	435.92	11	-	44	4.41	195	1.00	0.00	0.00	6.00	1.31	0.64	0.000	0.01	0.06	0.91	0.75	Yes	
L-P	167.7	K1	435.92	L1	434.42	11	-	44	4.41	195	1.00	0.00	0.00	6.00	0.89	0.53	0.001	0.01	0.06	0.91	0.75	Yes	
L-Q	56.1	L1	434.42	SCO-C	433.62	19	32	76	4.38	332	1.00	0.00	0.00	6.00	1.43	0.67	0.001	0.02	0.12	0.55	0.84	No	Flow deposits into C1; Incoming flow from Branch L-R

Main Line																						
105A	3.7	Fieldhouse	434.80	H1	434.78	21	83	83	4.38	363	1.00	0.00	0.00	6.00	0.55	0.42	0.001	0.02	0.12	0.60	0.84	No	
105B	28.7	H1	434.78	I1	434.61	21	-	83	4.38	363	1.00	0.00	0.00	4.00	0.59	0.15	0.004	0.04	0.16	0.48	0.88	No	
105C	22.7	I1	434.61	FF	434.45	21	-	83	4.38	363	1.00	0.00	0.00	8.00	0.70	1.01	0.001	0.01	0.08	0.95	0.79	Yes	
105	383.0	FF	434.45	GG	432.38	21	-	83	4.38	363	1.00	0.00	0.00	8.00	0.54	0.89	0.001	0.01	0.08	0.95	0.79	Yes	
106	48.0	GG	432.38	HH	432.09	21	-	83	4.38	363	1.00	0.00	0.00	8.00	0.60	0.94	0.001	0.01	0.08	0.95	0.79	Yes	
107	45.9	HH	432.09	LS	431.18	21	-	83	4.38	363	1.00	0.00	0.00	8.00	1.98	1.70	0.000	0.01	0.08	0.95	0.79	Yes	
108	1802.2	LS	431.18	MH E	474.78	21	-	83	4.38	363	1.00	0.00	0.00	6.00	-2.42	-	-	#N/A	#N/A	#N/A	#N/A	#N/A	ML 108 is a SFM & deposits into MH E
Main Line																						
109	53.6	II	441.60	JJ	439.34	0	-	-	4.50	-	1.00	-	-	8.00	4.22	2.48	-	#N/A	#N/A	#N/A	#N/A	#N/A	
110	168.8	JJ	439.24	KK	437.59	0	-	-	4.50	-	1.00	-	-	8.00	0.98	1.19	-	#N/A	#N/A	#N/A	#N/A	#N/A	
111	289.1	KK	437.49	LL	433.78	0	-	-	4.50	-	1.00	-	-	8.00	1.28	1.37	-	#N/A	#N/A	#N/A	#N/A	#N/A	
112	277.0	LL	433.68	MM	430.92	0	-	-	4.50	-	1.00	-	-	8.00	1.00	1.21	-	#N/A	#N/A	#N/A	#N/A	#N/A	
113	278.3	MM	430.82	NN	428.01	39	2,156	2,156	4.34	9,348	1.00	0.01	0.01	8.00	1.01	1.21	0.012	0.07	0.56	1.35	1.09	Yes	Incoming flow from ML L-F
114	18.1	NN	427.91	OO	427.73	39	-	**2,156**	4.34	9,348	1.00	0.01	0.01	8.00	0.99	1.20	0.012	0.07	0.56	1.35	1.09	Yes	
Branch L-9																						
L-9	28.81	N	484.66	ML 10	487.33	228	2,962	2,962	4.13	12,223	1.00	0.01	0.02	12.00	-9.27	-	-	#N/A	#N/A	#N/A	#N/A	#N/A	Flow deposits into ML 110
Branch L-G to L-H																						
L-G	30.94	F1	471.00	G1	469.40	0	2,000	2,000	4.50	9,000	1.00	0.01	0.01	4.00	5.17	0.43	0.032	0.12	0.48	2.35	1.05	Yes	
L-H	46.59	G1	469.40	AA	468.90	0	-	2,000	4.50	9,000	1.00	0.01	0.01	4.00	1.07	0.20	0.071	0.17	0.68	1.42	1.11	Yes	Flow deposits into MH AA
Branch L-I																						
L-I	35.14	BLDG A	472.45	ML 100	468.65	6	22	22	4.44	98	1.00	0.00	0.00	4.00	10.81	0.63	0.000	0.01	0.04	1.03	0.70	Yes	Flow deposits into ML 100
Branch L-J																						
L-J	35.18	BLDG A	473.30	ML 100	468.35	6	22	22	4.44	98	1.00	0.00	0.00	4.00	14.08	0.71	0.000	0.01	0.04	1.03	0.70	Yes	Flow deposits into ML 100
Branch L-K																						
L-K	6.97	BLDG D	471.60	ML 100	466.36	0	-	-	4.50	-	1.00	-	-	4.00	75.18	1.65	-	#N/A	#N/A	#N/A	#N/A	#N/A	Flow deposits into ML 100
Branch L-L																						
L-L	77.763	BLDG H	457.40	ML L-N	439.40	6	22	22	4.44	98	1.00	0.00	0.00	4.00	23.15	0.92	0.000	0.01	0.04	1.03	0.70	Yes	Flow deposits into ML L-N
Branch L-M																						
L-M	41.25	BLDG H	457.40	ML L-N	439.86	6	22	22	4.44	98	1.00	0.00	0.00	4.00	42.52	1.24	0.000	#N/A	#N/A	#N/A	#N/A	#N/A	Flow deposits into ML L-N
Branch L-R																						
L-R	28.94	BLDG G	436.00	L1	435.42	8	32	32	4.42	140	1.00	0.00	0.00	4.00	2.00	0.27	0.001	0.02	0.08	0.52	0.79	No	Flow deposits into ML L-Q
Branch L-A																						
L-A1	17.97	BLDG F	435.50	A1	435.14	9	36	36	4.42	160	1.00	0.00	0.00	4.00	2.00	0.27	0.001	0.02	0.08	0.60	0.79	No	
L-A	13.29	A1	435.14	B1	434.32	9	-	36	4.42	160	1.00	0.00	0.00	6.00	6.17	1.39	0.000	0.01	0.06	#DIV/0!	-	#DIV/0!	Flow deposits into B1

NOTES:

1. Population calculated based on Net Parcel Area (i.e. 80% of Gross Parcel Area) and using city of San Diego Density Conversions from Table 1-1 of the Sewer Design Guide. Refer to the Equivalent Population Summary Table in this report.
2. Peaking Factor for Dry Weather Flow (PFDW) calculated using the Ten States Standards, PFD = (18 + SQRT (Population/1000)) / (4 + SQRT (Population/1000)).
3. Peaking Factor for Wet Weather Flow (PFWW) was determined by the City of San Diego MWWD to be 1.0 (i.e. PFWW = 1.0) for the existing sewer system.
4. Full pipe flow with a value of "-" indicates a a zero or negative pipe slope. Q/Qfull with a value of "-" indicates no incoming flow.
5. Q/Qfull with a value of "-" indicates no incoming flow.
6. Inverts and pipe size diameters highlighted in yellow were not provided. The inverts have been calculated by interpolation and pipe sizes are shown as 8" and 6" to represent sanitary sewer mains and laterals, respectively.
7. Cells highlighted in dark blue indicate total flow.

Manning n: **0.013** (recommended design "n" is 0.013)
Design Particle Nom Dia (mm): **1.00**
Specific Wt of Water (lbs/ft^3) **62.40**

SOUTHWESTERN COLLEGE
PROPOSED SANITARY SEWER STUDY SUMMARY
DATE: 1/11/2016

JOB NO: 149950 BY: SAR FOR: SOUTHWESTERN COLLEGE

Line	Length (ft)	From MH	From I.E.	To MH	To I.E.	Population (persons)	ADWF (gpd)	ADWF Cumulative (gpd)	Peaking Factor for DWF (PFDW)[2]	PDWF (gpd)	Peaking Factor for WWF (PFWW)[3]	Peak Wet Weather Flow (PWWF) (Design Flow) mgd	Peak Wet Weather Flow (PWWF) (Design Flow) cfs	Pipe Size Diameter (in)	Pipe Slope (%)	Full Pipe Flow (cfs)[4]	Q/Qfull[5]	Calculated d/D	Calculated Normal Depth (d_n)	Pipe Velocity (ft/s)	Min. Self Cleansing Velocity (ft/s)	Sewer Self Cleansing[3]	Remarks
Main Line																							
1	350.12	A	488.25	B	484.54	1455	18,916	18,916	3.69	69,783	1.00	0.07	0.11	8.00	1.06	1.24	0.087	0.19	1.52	2.34	1.27	Yes	Incoming flow from Branch L-4 and L-5 Incoming flow from Buildings 540, 550 & 560
2	351.23	B	484.64	C	483.80	1813	14,117	23,575	3.62	85,305	1.00	0.09	0.13	8.00	0.24	0.59	0.223	0.32	2.56	1.37	1.37	Yes	Flow from MH B split between ML 2 & ML 11 Incoming flow from Building 600 and Branch L-7
3	342.42	C	483.80	D	482.98	6255	57,734	81,309	3.15	256,412	1.00	0.26	0.40	8.00	0.24	0.59	0.671	0.59	4.72	1.85	1.47	Yes	Incoming flow from ML 9, ML 14, and Branch L-19&L-14
4	351.1	D	482.98	E	470.45	6910	8,520	89,829	3.11	279,552	1.00	0.28	0.43	8.00	3.57	2.28	0.190	0.29	2.32	5.15	1.35	Yes	Incoming flow from Branch L-15
5	134.9	E	470.45	F	465.55	9004	27,041	116,870	3.00	350,586	1.00	0.35	0.54	8.00	3.63	2.30	0.236	0.33	2.64	5.40	1.37	Yes	Incoming flow from ML 108
6	96.1	F	465.55	G	462.06	9004	-	116,870	3.00	350,586	1.00	0.35	0.54	8.00	3.63	2.30	0.236	0.33	2.64	5.40	1.37	Yes	
6a	403	G	462.06	G1	461.01	9004	-	116,870	3.00	350,586	1.00	0.35	0.54	10.00	0.26	1.12	0.485	0.49	4.90	2.04	1.50	Yes	
Main Line																					-	Yes	
7	161.1	H	496.05	I	491.31	640	8,320	8,320	3.92	32,588	1.00	0.03	0.05	4.00	2.94	0.33	0.155	0.26	1.04	2.80	1.18	Yes	Incoming flow from Buildings 400-480
8	249.5	I	491.31	J	488.22	490	4,426	6,373	3.98	25,357	1.00	0.03	0.04	8.00	1.24	1.34	0.029	0.11	0.88	1.88	1.17	Yes	Flow from MH I split between ML 8 & ML 10 Incoming flow from Branch L-8
9	354.7	J	488.22	C	483.80	490	-	6,373	3.98	25,357	1.00	0.03	0.04	8.00	1.25	1.35	0.029	0.11	0.88	1.88	1.17	Yes	Incoming flow from Buildings 300-340
Main Line																							
10	357.3	I	491.31	ML 2	484.41	718	9,335	9,335	3.89	36,296	1.00	0.04	0.06	8.00	1.93	1.68	0.033	0.12	0.96	2.37	1.18	Yes	Flow from MH I split between ML 8 & ML 10
Main Line																							
11	364.7	B	484.69	K	480.55	787	10,231	10,231	3.86	39,539	1.00	0.04	0.06	8.00	1.14	1.29	0.048	0.14	1.12	2.06	1.21	Yes	Flow from MH B split between ML 2 & ML 11
12	347.6	K	480.35	M	478.87	2306	19,745	29,976	3.54	106,023	1.00	0.11	0.16	8.00	0.43	0.79	0.208	0.30	2.40	1.86	1.36	Yes	Incoming flow from Branch L-10 and L-11 Incoming flow from Buildings 610 & 1505
Main Line																							
13	75.5	L	473.19	M	478.87	768	9,984	9,984	3.87	38,646	1.00	0.04	0.06	8.00	-7.53	-	-	#N/A	#N/A	#N/A	#N/A	#N/A	Incoming flow from Branch L-12 and L-13
14	363.5	M	478.87	C	483.80	3292	32,811	42,794	3.41	145,836	1.00	0.15	0.23	8.00	-1.36	-	-	#N/A	#N/A	#N/A	#N/A	#N/A	Incoming flow from ML 12 and Bldgs 700&710 Flow deposits into MH C
Main Line																							
100	287.6	AA	468.90	BB	465.80	11	2,044	2,044	4.41	9,016	1.00	0.01	0.01	8.00	1.08	1.25	0.011	0.07	0.56	1.30	1.09	Yes	Incoming flow from Branch L-H, L-I, L-J, & L-K
101	104.2	BB	465.80	CC	453.50	11	-	2,044	4.41	9,016	1.00	0.01	0.01	8.00	11.80	4.15	0.003	0.04	0.32	2.98	0.99	Yes	
102	77.8	CC	453.50	DD	434.48	11	-	2,044	4.41	9,016	1.00	0.01	0.01	8.00	24.44	5.97	0.002	0.03	0.24	4.57	0.95	Yes	
L-B	23.5	DD	434.48	B1	434.32	11	-	2,044	4.41	9,016	1.00	0.01	0.01	6.00	0.68	0.46	0.030	0.11	0.66	1.19	1.11	Yes	
L-C	102.7	B1	434.32	C1	433.62	20	36	2,081	4.38	9,113	1.00	0.01	0.01	6.00	0.68	0.46	0.030	0.11	0.66	1.20	1.11	Yes	Incoming flow from Branch L-A (capped)
L-D	78.7	C1	433.62	D1	433.10	39	76	2,156	4.34	9,348	1.00	0.01	0.01	6.00	0.66	0.46	0.032	0.12	0.72	1.08	1.13	No	Incoming flow from ML L-Q
L-E	73.5	D1	433.10	E1	432.63	39	-	2,156	4.34	9,348	1.00	0.01	0.01	6.00	0.64	0.45	0.032	0.12	0.72	1.08	1.13	No	
L-F	39.3	E1	432.63	ML 113	429.40	39	-	2,156	4.34	9,348	1.00	0.01	0.01	6.00	8.22	1.61	0.009	0.06	0.36	3.01	1.01	Yes	Flow deposits into ML 113
Main Line																							
L-N1	36.3	BLDG J	458.60	J01	442.00	0	-	-	4.50	-	1.00	-	-	4.00	45.78	1.29	-	#N/A	#N/A	#N/A	#N/A	#N/A	
L-N	248.2	J01	442.00	J1	436.53	11	44	44	4.41	195	1.00	0.00	0.00	6.00	2.20	0.83	0.000	0.01	0.06	0.91	0.75	Yes	Incoming flow from Branches L-L & L-M
L-O	46.6	J1	436.53	K1	435.92	11	-	44	4.41	195	1.00	0.00	0.00	6.00	1.31	0.64	0.000	0.01	0.06	0.91	0.75	Yes	
L-P	167.7	K1	435.92	L1	434.42	11	-	44	4.41	195	1.00	0.00	0.00	6.00	0.89	0.53	0.001	0.01	0.06	0.91	0.75	Yes	
L-Q	56.1	L1	434.42	SCO-C	433.62	19	32	76	4.38	332	1.00	0.00	0.00	6.00	1.43	0.67	0.001	0.02	0.12	0.55	0.84	No	Flow deposits into C1; Incoming flow from Branch L-R
Main Line																							

105A	3.7	Fieldhouse	434.80	H1	434.78	21	83	83	4.38	363	1.00	0.00	0.00	6.00	0.55	0.42	0.001	0.02	0.12	0.60	0.84	No	
105B	28.7	H1	434.78	I1	434.61	21	-	83	4.38	363	1.00	0.00	0.00	4.00	0.59	0.15	0.004	0.04	0.16	0.48	0.88	No	
105C	22.7	I1	434.61	FF	434.45	21	-	83	4.38	363	1.00	0.00	0.00	8.00	0.70	1.01	0.001	0.01	0.08	0.95	0.79	Yes	
105	383.0	FF	434.45	GG	432.38	21	-	83	4.38	363	1.00	0.00	0.00	8.00	0.54	0.89	0.001	0.01	0.08	0.95	0.79	Yes	
106	48.0	GG	432.38	HH	432.09	21	-	83	4.38	363	1.00	0.00	0.00	8.00	0.60	0.94	0.001	0.01	0.08	0.95	0.79	Yes	
107	45.9	HH	432.09	LS	431.18	21	-	83	4.38	363	1.00	0.00	0.00	8.00	1.98	1.70	0.000	0.01	0.08	0.95	0.79	Yes	
108	1802.2	LS	431.18	MH E	474.78	2094	26,958	27,041	3.57	96,539	1.00	0.10	0.15	6.00	-2.42	-	-	#N/A	#N/A	#N/A	#N/A	#N/A	ML 108 is a SFM & deposits into MH E
Main Line																							
109	53.6	II	441.60	JJ	439.34	0	-	-	4.50	-	1.00	-	-	8.00	4.22	2.48	-	#N/A	#N/A	#N/A	#N/A	#N/A	
110	168.8	JJ	439.24	KK	437.59	0	-	-	4.50	-	1.00	-	-	8.00	0.98	1.19	-	#N/A	#N/A	#N/A	#N/A	#N/A	
111	289.1	KK	437.49	LL	433.78	0	-	-	4.50	-	1.00	-	-	8.00	1.28	1.37	-	#N/A	#N/A	#N/A	#N/A	#N/A	
112	277.0	LL	433.68	MM	430.92	0	-	-	4.50	-	1.00	-	-	8.00	1.00	1.21	-	#N/A	#N/A	#N/A	#N/A	#N/A	
113	278.3	MM	430.82	NN	428.01	39	2,156	2,156	4.34	9,348	1.00	0.01	0.01	8.00	1.01	1.21	0.012	0.07	0.56	1.35	1.09	Yes	Incoming flow from ML L-F
114	18.1	NN	427.91	OO	427.73	39	-	**2,156**	4.34	9,348	1.00	0.01	0.01	8.00	0.99	1.20	0.012	0.07	0.56	1.35	1.09	Yes	
Branch L-9																							
L-9	28.81	N	484.66	ML 10	487.33	228	2,962	2,962	4.13	12,223	1.00	0.01	0.02	12.00	-9.27	-	-	#N/A	#N/A	#N/A	#N/A	#N/A	Flow deposits into ML 110
Branch L-G to L-H																							
L-G	30.94	F1	471.00	G1	469.40	0	2,000	2,000	4.50	9,000	1.00	0.01	0.01	4.00	5.17	0.43	0.032	0.12	0.48	2.35	1.05	Yes	
L-H	46.59	G1	469.40	AA	468.90	0	-	2,000	4.50	9,000	1.00	0.01	0.01	4.00	1.07	0.20	0.071	0.17	0.68	1.42	1.11	Yes	Flow deposits into MH AA
Branch L-I																							
L-I	35.14	BLDG A	472.45	ML 100	468.65	6	22	22	4.44	98	1.00	0.00	0.00	4.00	10.81	0.63	0.000	0.01	0.04	1.03	0.70	Yes	Flow deposits into ML 100
Branch L-J																							
L-J	35.18	BLDG A	473.30	ML 100	468.35	6	22	22	4.44	98	1.00	0.00	0.00	4.00	14.08	0.71	0.000	0.01	0.04	1.03	0.70	Yes	Flow deposits into ML 100
Branch L-K																							
L-K	6.97	BLDG D	471.60	ML 100	466.36	0	-	-	4.50	-	1.00	-	-	4.00	75.18	1.65	-	#N/A	#N/A	#N/A	#N/A	#N/A	Flow deposits into ML 100
Branch L-L																							
L-L	77.763	BLDG H	457.40	ML L-N	439.40	6	22	22	4.44	98	1.00	0.00	0.00	4.00	23.15	0.92	0.000	0.01	0.04	1.03	0.70	Yes	Flow deposits into ML L-N
Branch L-M																							
L-M	41.25	BLDG H	457.40	ML L-N	439.86	6	22	22	4.44	98	1.00	0.00	0.00	4.00	42.52	1.24	0.000	#N/A	#N/A	#N/A	#N/A	#N/A	Flow deposits into ML L-N
Branch L-R																							
L-R	28.94	BLDG G	436.00	L1	435.42	8	32	32	4.42	140	1.00	0.00	0.00	4.00	2.00	0.27	0.001	0.02	0.08	0.52	0.79	No	Flow deposits into ML L-Q
Branch L-A																							
L-A1	17.97	BLDG F	435.50	A1	435.14	9	36	36	4.42	160	1.00	0.00	0.00	4.00	2.00	0.27	0.001	0.02	0.08	0.60	0.79	No	
L-A	13.29	A1	435.14	B1	434.32	9	-	36	4.42	160	1.00	0.00	0.00	6.00	6.17	1.39	0.000	0.01	0.06	0.75	0.75	No	Flow deposits into B1
Branch L-S																							
L-S1	59.25	PLUG	432.84	M1	431.64	2074	26,958	26,958	3.57	96,334	1.00	0.10	0.15	8.00	2.03	1.72	0.087	0.19	1.52	3.23	1.27	Yes	Incoming flow from Performing Arts/Wellness & Aqua.
L-S	13.06	M1	431.64	LS	431.50	2074	-	26,958	3.57	96,334	1.00	0.10	0.15	8.00	1.07	1.25	0.119	0.23	1.84	2.46	1.31	Yes	Flow deposits into Lift Station

NOTES:

1. Population calculated based on Net Parcel Area (i.e. 80% of Gross Parcel Area) and using city of San Diego Density Conversions from Table 1-1 of the Sewer Design Guide. Refer to the Equivalent Population Summary Table in this report.
2. Peaking Factor for Dry Weather Flow (PFDW) calculated using the Ten States Standards, PFDW = (18 + SQRT (Population/1000)) / (4 + SQRT (Population/1000)).
3. Peaking Factor for Wet Weather Flow (PFWW) was determined by the City of San Diego MWWD to be 1.0 (i.e. PFWW = 1.0) for the existing sewer system.
4. Full pipe flow with a value of "-" indicates a a zero or negative pipe slope. Q/Qfull with a value of "-" indicates no incoming flow.
5. Q/Qfull with a value of "-" indicates no incoming flow.
6. Inverts and pipe size diameters highlighted in yellow were not provided. The inverts have been calculated by interpolation and pipe sizes are shown as 8" and 6" to represent sanitary sewer mains and laterals, respectively.
7. Cells highlighted in dark blue indicate total flow.

Appendix D

SOUTHWESTERN COLLEGE
EXISTING AND PROJECTED SEWER COMPARISON

DATE: 1/11/2016

	BUILDING	CURRENT			PROPOSED		
		POPULATION	ADWF (gpd)	PDWF (gpd)	POPULATION	ADWF (gpd)	PDWF (gpd)
EXISTING	100	65	851	3,649	65	851	3,649
	102	28	362	1,576	28	362	1,576
	103	48	624	2,696	48	624	2,696
	104	28	369	1,607	28	369	1,607
	105	92	1,200	5,104	92	1,200	5,104
	200	118	1,537	6,491	118	1,537	6,491
	210	162	2,101	8,782	162	2,101	8,782
	220	117	1,523	6,435	117	1,523	6,435
	300 [2]	62	805	3,458	-	-	-
	310 [2]	83	1,083	4,620	-	-	-
	320 [2]	89	1,162	4,945	-	-	-
	330 [2]	102	1,327	5,627	-	-	-
	340 [2]	83	1,081	4,609	-	-	-
	381 [2]	25	327	1,427	-	-	-
	382 [2]	25	331	1,446	-	-	-
	390 [2]	103	1,336	5,663	-	-	-
	400	32	414	1,799	32	414	1,799
	410	84	1,086	4,631	84	1,086	4,631
	420	340	4,426	17,946	340	4,426	17,946
	430	109	1,411	5,974	109	1,411	5,974
	440	83	1,076	4,590	83	1,076	4,590
	450	22	281	1,230	22	281	1,230
	460	98	1,276	5,417	98	1,276	5,417
	470	146	1,893	7,943	146	1,893	7,943
	480	68	883	3,786	68	883	3,786
	500	119	1,546	6,527	119	1,546	6,527
	510	79	1,032	4,408	79	1,032	4,408
	540	117	1,522	6,430	117	1,522	6,430
	550	118	1,532	6,469	118	1,532	6,469
	560	117	1,522	6,429	117	1,522	6,429
	570	119	1,552	6,553	119	1,552	6,553
	590	150	1,952	8,181	150	1,952	8,181
	590	150	1,952	8,181	150	1,952	8,181
	590	150	1,952	8,181	150	1,952	8,181
	600	308	4,009	16,329	308	4,009	16,329
	610	343	4,461	18,080	343	4,461	18,080
	620	340	4,420	17,923	340	4,420	17,923
	620	170	2,210	9,223	170	2,210	9,223
	640	44	570	2,466	44	570	2,466
	650	33	434	1,885	33	434	1,885
	660	50	652	2,811	50	652	2,811
	700	119	1,542	6,512	119	1,542	6,512
	710	99	1,292	5,485	99	1,292	5,485
	750	156	2,029	8,493	156	2,029	8,493
	800	118	1,538	6,495	118	1,538	6,495
	850	98	1,274	5,408	98	1,274	5,408
	900	283	3,680	15,046	283	3,680	15,046
	1000 [2]	331	4,302	17,465	-	-	-
	1006 [2]	63	813	3,491	-	-	-
	1020 [2]	122	1,586	6,693	-	-	-
	1100	90	1,166	4,963	90	1,166	4,963
	1200	127	1,654	6,969	127	1,654	6,969

EXISTING	1400	228	2,962	12,223	228	2,962	12,223
	1500 [2]	558	7,257	28,659	-	-	-
	1505	17	216	950	17	216	950
	1560	63	813	3,491	63	813	3,491
	1600	38	489	2,122	38	489	2,122
	1620	32	413	1,795	32	413	1,795
	1630	30	390	1,698	30	390	1,698
	1660	43	557	2,409	43	557	2,409
	1670	32	418	1,818	32	418	1,818
	2008 [2]	29	375	1,634	-	-	-
	Central Plant		2,000	3,300		2,000	3,300
	Fieldhouse Building [3]	21	83	-	21	83	-
	BLDG A [3]	11	44	-	11	44	-
	BLDG F [3]	9	36	-	9	36	-
	BLDG G [3]	8	32	-	8	32	-
	BLDG H [3]	11	44	-	11	44	-
PROPOSED	Math/Science Center - North Bldg				700	9,100	35,440
	Math/Science Center - South Bldg				350	4,550	18,423
	Math/Science Auditorium[1]				240	3,116	12,832
	Wellness/Aquatic Center - Gym[1]				1,201	15,615	58,514
	Wellness/Aquatic Center - Pools[1]				373	4,843	19,549
	Performing Arts Center				500	6,500	25,832
TOTAL		**7,356**	**97,087**	**398,645**	**9,043**	**119,026**	**479,499**

NOTES:

1. ADWF calculated based on Public and Commercial Facilities Average Daily flow Projections Table F229, Bureau of Engineering, Manual-Part F
2. Existing buildings to be replaced with new buildings indicated in the "Proposed" rows
3. Buildings receiving flow from Devore Stadium. The peak flow and time of Devore Stadium does not occur similarly to or at the same time as SWC Campus' peak and is excluded from this table.

PUBLIC AND COMMERCIAL FACILITIES AVERAGE DAILY FLOW PROJECTIONS
TABLE F229

Units	Ave. daily flow (gpd/unit)	Type description
SEAT	5/SEAT	AUDITORIUM
1000 GR.SQ.FT.	25/1000 GR.SQ.FT.	AUTO PARKING
1000 GR.SQ.FT.	100/1000 GR.SQ.FT.	AUTO REPAIR GARAGE
1000 GR.SQ.FT.	300/1000 GR.SQ.FT.	BAKERY
7 GR.SQ.FT.	5/7 GR.SQ.FT.	BALLROOM
1000 GR.SQ.FT.	200/1000 GR.SQ.FT.	BANK: HEADQUARTERS
1000 GR.SQ.FT.	100/1000 GR.SQ.FT.	BANK: BRANCH
15 GR.SQ.FT.	20/15 GR.SQ.FT.	BANQUET RMS/CONFERENCE
SEAT	20/SEAT	BAR: FIXED SEAT
1000 GR.SQ.FT.	100/1000 GR.SQ.FT.	BAR: JUICE (NO FOOD)
15 GR.SQ.FT.	20/15 GR.SQ.FT.	BAR:PUB. AREAS(TABLES)
1000 GR.SQ.FT.	100/1000 GR.SQ.FT.	BARBER SHOP
1000 GR.SQ.FT.	300/1000 GR.SQ.FT.	BEAUTY COLLEGE
1000 GR.SQ.FT.	25/1000 GR.SQ.FT.	BEAUTY CLG. STRG>15%
1000 GR.SQ.FT.	200/1000 GR.SQ.FT.	BEAUTY COLLEGE:OFFICE>
1000 GR.SQ.FT.	300/1000 GR.SQ.FT.	BEAUTY PARLOR
OFFICE	200/OFFICE	BLDG. CONSTR. OFFICE
1000 GR.SQ.FT.	300/1000 GR.SQ.FT.	BOWLING ALLEY
SEAT	50/SEAT	CAFETERIA: FIXED SEAT
GPM PEAK	412/GPM	CARWASH: BASED ON PEAK
STALL	206/STALL	CAR WASH: COIN-OPERATED
5 GPM PEAK	412/GPM	CARWASH: IN BAY
SEAT	5/SEAT	CHURCH:FIXED SEAT
1000 GR.SQ.FT.	300/1000 GR.SQ.FT	CHIROPRACTIC OFFICE
OCCUPANT	10/OCCUPANT	ChurchSch:DayCare/Elem.
20 GR.SQ.FT.	5/20 GR.SQ.FT.	CHURCH SCH: 1 DAY USE/W
N/A	NO CHARGE	CITY: BLDG. CONTS. OFC.
1000 GR.SQ.FT.	300/1000 GR.SQ.FT.	CLINIC
SEAT	20/SEAT	COCKTAIL LOUNGE:FXD ST
1000 GR.SQ.FT.	25/1000 GR.SQ.FT.	COLD STORAGE:NO SALES
1000 GR.SQ.FT.	100/1000 GR.SQ.FT.	ColdStorage:RetailSales
FIXTURE	120/FIXTURE	COMFORT STATION:PUBLIC
1000 GR.SQ.FT.	100/1000 GR.SQ.FT.	COMMERCIAL USE
OCCUPANT	5/OCCUPANT	COMMUNITY CENTER
1000 GR.SQ.FT.	200/1000 GR.SQ.FT.	CREDIT UNION
GPM PEAK	412/GPM	DAIRY
GPM PEAK	412/GPM	DAIRY: BARN
1000 GR.SQ.FT.	100/1000 GR.SQ.FT.	DAIRY: RETAIL AREA
7 GR.SQ.FT.	5/7 GR.SQ.FT.	DANCE HALL
15 GR.SQ.FT.	20/15 GR.SQ.FT.	DISCOTEQUE
1000 GR.SQ.FT.	300/1000 GR.SQ.FT.	DOUGHNUT SHOP
1000 GR.SQ.FT.	300/1000 GR.SQ.FT.	DRUG ABUSE
1000 GR.SQ.FT.	100/1000 GR.SQ.FT.	
FILM PROCESSINGGPM PEAK	412/GPM	FOOD PROCESSING PLANT
URINAL OR W.C.	120/W.C.	GAS STATION:SELF SERVE
STATION	430/STATION	GAS STATION:4 BAYS MAX

1000 GR.SQ.FT.	300/1000 GR.SQ.FT.	GYMNASIUM
1000 GR.SQ.FT.	100/1000 GR.SQ.FT.	HANGAR (AIRCRAFT)
BED	85/BED	HOSPITAL: CONVALESCENT
1000 GR.SQ.FT.	300/1000 GR.SQ.FT.	HOSPITAL: DOG AND CAT
BED	85/BED	HOSPITAL: NONPROFIT
BED	500/BED	HOSPITAL: SURGICAL
UNIT	150/UNIT	HOUSEKEEPING:LIGHT
GPM PEAK	412/GPM	INDUSTRIAL
INMATE	85/INMATE	JAIL
1000 GR.SQ.FT.	100/1000 GR.SQ.FT.	DOG KENNEL/OPEN
1000 GR.SQ.FT.	300/1000 GR.SQ.FT.	LAB: COMMERCIAL
GPM PEAK	412/GPM	LAUNDROMAT:INDUSTRIAL
WASHER	220/WASHER	LAUNDROMAT
WASHER	220/WASHER	LAUNDROMAT:AUTOMATIC
50 GR.SQ.FT.	50/50 GR.SQ.FT.	LIBRARY:PUBLIC AREA
1000 GR.SQ.FT.	25/1000 GR.SQ.FT.	LIBRARY:STACKS/STORAGE
SEAT	5/SEAT	LODGE HALL
1000 GR.SQ.FT.	100/1000 GR.SQ.FT.	MACHINE SHOP
1000 GR.SQ.FT.	100/1000 GR.SQ.FT.	MNFG/INDUSTRY
1000 GR.SQ.FT.	300/1000 GR.SQ.FT.	MASSAGE PARLOR
1000 GR.SQ.FT.	300/1000 GR.SQ.FT.	MEDICAL BLDG
1000 GR.SQ.FT.	200/1000 GR.SQ.FT.	MINI-MALL (SHELL)
7 GR.SQ.FT.	5/7 GR.SQ.FT.	MORTUARY:CHAPEL
1000 GR.SQ.FT.	100/1000 GR.SQ.FT.	MORTUARY: LIVING AREA
ROOM	150/ROOM	MOTEL
1000 GR.SQ.FT.	25/1000 GR.SQ.FT.	MUSEUM: ALL AREAS
1000 GR.SQ.FT.	200/1000 GR.SQ.FT.	OFFICE OVER 15%
1000 GR.SQ.FT.	100/1000 GR.SQ.FT.	MUSEUM: SALE AREA
1000 GR.SQ.FT.	200/1000 GR.SQ.FT.	OFFICE BUILDING
GPM PEAK	412/GPM	PLATING PLANT
1000 GR.SQ.FT.	100/1000 GR.SQ.FT.	POOL HALL(NO BEER/WINE)
1000 GR.SQ.FT.	120/1000 GR.SQ.FT.	POST OFFICE: FLOOR PLAN
STUDENT	85/STUDENT	DORM: COLLEGE OR RES.
DWELLING UNIT	330/DU	RES: TOWNHS/SET GRD
DWELLING	150/DU	RES: APT. - 1 BDR
DWELLING	200/DU	RES: APT. - 2 BDR
DWELLING	250/DU	RES: APT. - 3 BDR
DWELLING	100/DU	RES: APT. - BACH/SNGLE
BED	85/BED	RES: BOARDING HOUSE
DWELLING	150/DU	RES: CONDO-1 BDR
DWELLING	200/DU	RES: CONDO-2 BDR
DWELLING	250/DU	RES: CONDO-3 BDR
DWELLING UNIT	300/DU	RES: DUPLEX
HOME SPACE	200/SPACE	RES: MOBILE HOME
DWELLING UNIT	330/DU	RES: SNGL FAM DWL.
1000 GR.SQ.FT.	300/1000 GR.SQ.FT.	RES: ARTIST (2/3 AREA)
DWELLING	100/DU	
RES: ARTIST	330/DU	RES: GUEST HOUSE W/KIT.
RESDNCE.DWELLING UNIT		
BED	85/BED	REST HOME
SEAT DINING	50/SEAT	RESTAURANT: DRIVE-UP
PARKING STALL	100/STALL	RESTAURANT: DRIVE-UP
SEAT	50/SEAT	RESTAURANT: FIXED SEAT
1000 GR.SQ.FT.	300/1000 GR.SQ.FT.	RESTAURANT: TAKE-OUT

1000 GR.SQ.FT.	100/1000 GR.SQ.FT.	RETAIL AREA
CHILD	10/CHILD	SCHL: DAY CARE CENTER
STUDENT	10/STUDENT	SCHL: ELEMENTARY/JR-HI
STUDENT	15/STUDENT	SCHL: HIGH SCHOOL
35 GR.SQ.FT.	10/35 GR.SQ.FT.	SCHL: KINDERGARTEN
CHILD	10/CHILD	SCHL: NURSERY-DAY CARE
STUDENT	10/STUDENT	SCHL: SPECIAL CLASS-LAC
STUDENT	15/STUDENT	SCHL: TRADE OR VOCTNL
STUDENT	20/STUDENT	SCHL: UNIV. OR COLLEGE
1000 GR.SQ.FT.	25/1000 GR.SQ.FT.	StorageBldg-RentingSpace
1000 GR.SQ.FT.	10/1000 GR.SQ.FT.	ICE CREAM STORE(RETAIL)
70 GR.SQ.FT.	5/7 GR.SQ.FT.	STUDIO: MOTION PICTURE
1000 GR.SQ.FT.	100/1000 GR.SQ.FT.	STUDIO: RECORDING
VEHICLE	12/VEHICLE	THEATRE: DRIVE-IN
SEAT	5/SEAT	THEATRE: FIXED SEAT
1000 GR.SQ.FT.	5/SEAT	THEATRE: MOVIE HOUSE
1000 GR.SQ.FT.	300/1000 GR.SQ.FT.	VETERINARIAN
1000 GR.SQ.FT.	25/1000 GR.SQ.FT.	WAREHOUSE
STATION	430/STATION	WASTE DUMP: RECREATIONAL
1000 GR.SQ.FT.	215/1000 GR.SQ.FT.	WINE TASTING RM: KTCHN
1000 GR.SQ.FT.	100/1000 GR.SQ.FT.	WineTastingRm: AllArea

EXPLANATION FOOTNOTES

1. The column headings are:
   Average Daily Flow = flow in gallons per day (gpd) per unit as indicated. For example, "5/7 gr. sq. ft." means 5 gpd per every 7 gross square feet of development. Type description - type of development or process.

2. Gr. sq. ft. = gross square feet: area included within the exterior of the surrounding walls of a building excluding courts.

3. Gpm Peak = peak flow in gallons per minute. There is an assumption that the peak to average flow ratio is 3.5. Therefore, 1 gpm x 1440 min/day) 3.5 = 412 gpd which is the unit flow factor in the table.

4. Example Calculation - Assume a 10,000 sq. ft. office building is proposed. The estimated average daily flow is calculated as 10,000 sq. ft. x 200 gpd/1000 sq. ft. = 2000 gpd.

5. Another Example - Assume a car wash (in bay type) is proposed. The estimated peak flow is 5 gpm as determined by industrial waste permit or other data. The average daily flow is estimated as 5 gpm x 412 gpd/gpm = 2060 gpd.