

**Sewer Capacity Study
For
Sharp Chula Vista Medical Center Expansion**

**Rick Job No. 17124
January 6, 2014**

RICK ENGINEERING COMPANY

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For
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Submitted to:
City of Chula Vista

REC Job No. J-17124
Prepared: January 6, 2014



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Introduction

This Sewer Study Report is being prepared to support the proposed Sharp Chula Vista Medical Center (Medical Center) expansion. The proposed Medical Center expansion is anticipated to occur in a total of five phases that are to be spaced out over the next 15-20 years. This report will analyze the final build out condition for the Medical Center expansion that would exist after the completion of all of the proposed phases. This study will show that the proposed 8" sewer pipe that will serve the proposed expansion is adequately sized. It will also demonstrate that the proposed sewer flows that are generated as a result of the final build out of the Medical Center are less than the Master Plan flows allotted to this site.

The Sharp Chula Vista Medical Center is located at 751 Medical Center Court. The project site is located within the City of Chula Vista, south of Telegraph Canyon Road between Medical Center Drive and Paseo Ladera. Based upon Assessors Parcel information, the total site area for the Medical Center is 32.95 acres. Per the City of Chula Vista Wastewater Master Plan, dated May 2005, and the Preliminary Sewer Capacity Study for the Sharp Chula Vista Medical Center Cancer Center prepared by K&S Engineering, dated August 2010, the Medical Center site is located at the crest point between the Telegraph Canyon Basin to the North and the Poggi Canyon Basin to the South.

Review of the K&S Engineering sewer study indicates that approximately 10.77 acres of the Medical Center site, which comprises the Sharp Chula Vista Medical Cancer Center area, drains towards the Poggi Canyon Basin. The remaining 22.18 acres of the Medical Center site, which is the location of the proposed Medical Center Expansion, drains towards the Telegraph Canyon Basin. Review of the City of Chula Vista Sewer Master

Plan – Telegraph Canyon Model Map – Exhibit 2, reveals that the entire 32.95 acre Medical Center site area was originally anticipated to flow into the Telegraph Canyon Basin sewer system from parcels 73 and 75 of that report.

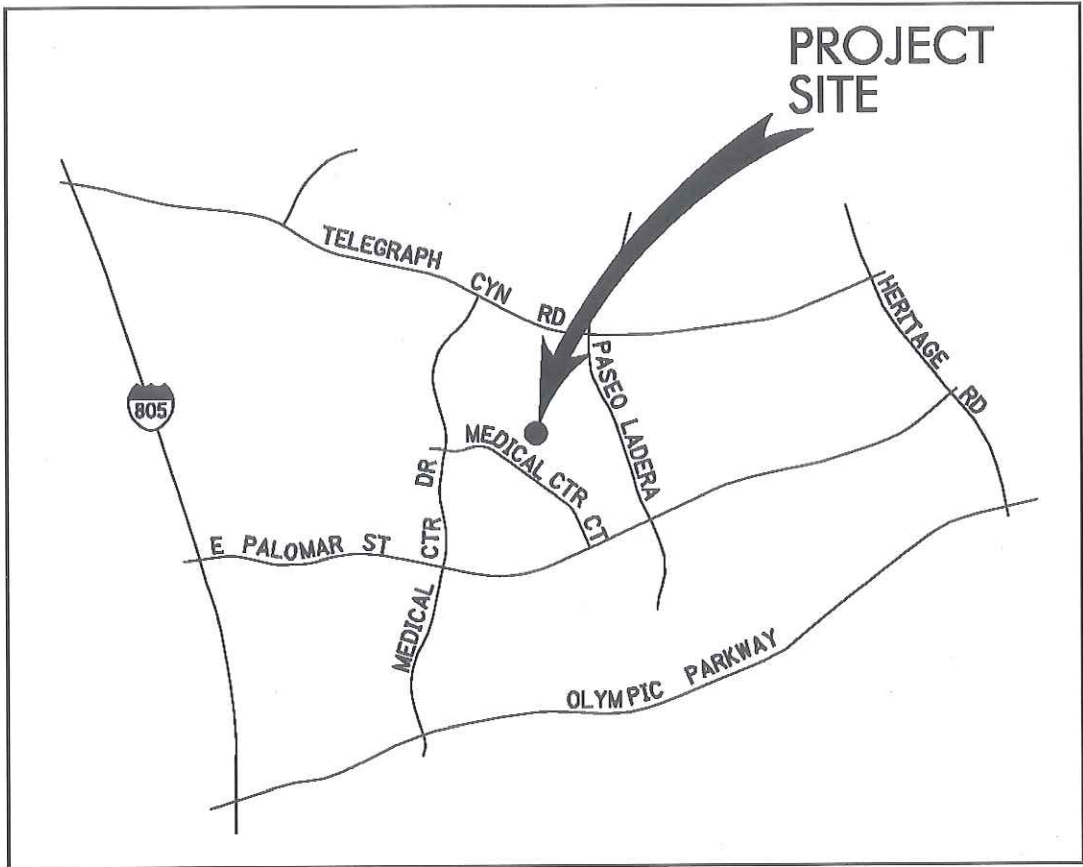
Purpose

The purpose of this sewer study is to:

- 1) Size the proposed sewer line that is to be constructed within the proposed loop roadway.
- 2) Show that the proposed sewer generation for the subject development is consistent with the City of Chula Vista Wastewater Master Plan.
- 3) Show that the proposed flows downstream of the Sharp Chula Vista Medical Center are less than or equal to the flows per the City of Chula Vista Sewer Master Plan.

Land Use

The existing and proposed land use for the subject site is Institutional/Medical. Per the City of Chula Vista Subdivision Manual – Sewer Design criteria, Institutional/Medical flows are based upon a sewage flow rate of 2,500 gal / day / acre.



VICINITY MAP
(NTS)

Sewer Collection System

The portion of the Medical Center site that is to be improved upon for the proposed Medical Center Expansion lies completely within the Telegraph Canyon Sewer Basin. Presently, sewage that is produced within this portion of the Medical Center flows into an existing 10-inch sewer pipe located within Medical Center Court (formerly Dora Lane). Review of the as-built drawings for the existing 10-inch sewer pipe within Medical Center Court shows that the pipe has slopes that range from 0.4% to 10.1%. Wastewater collected within Medical Center Court flows in a Westerly direction into an existing 10-inch sewer pipe located within Medical Center Drive (formerly Brandywine Avenue). Review of the as-built drawings for the existing 10-inch sewer pipe within Medical Center Drive shows that the pipe has slopes that range from 0.4% to 8.9%. Wastewater collected within Medical Center Drive flows northerly to an existing 15-inch sewer pipe within Telegraph Canyon Road. From Telegraph Canyon Road, wastewater flows Westerly to an existing connection to the South Metro Interceptor located just west of Interstate 5. The South Metro Interceptor is a regional transmission facility that is owned, operated and maintained by the City of San Diego Metropolitan Wastewater Department and conveys flows northwards to the Point Loma Treatment Plant.

Design Criteria and Abbreviations

The following is a list of criteria, obtained from the City of Chula Vista Subdivision Manual – Sewer Design criteria, for the analysis of the sewer system:

- Institutional/Medical flows are based on 2,500 gal / day / acre
- Residential flows are based on 80 gal / capita / day
- Manning's "N" value :
 - Vitriified Clay pipes = 0.013 for diameters less than or equal to 21-inches
 - PVC pipes = 0.013 for all pipe sizes
- 0.50 dn/D for pipes less than or equal to 12 inches.
0.75 dn/D for pipes greater than 12 inches.
- Minimum velocity = 2.0 feet/second at peak
- Maximum velocity = 12.0 feet/second at peak
- Sewer mains that do not sustain a minimum velocity of 2.0 feet/second at peak flow shall be designed to have a minimum slope of 1%.
- Public sewer mains shall be 8" minimum.
- gpd = Gallons per Day
- gpm = Gallons per Minute
- mgd – Million Gallons per Day
- MH = Manhole

Projected Sewer Flows

As the subject site is located at the top the basin, no offsite tributary flows affect the subject development and need to be accounted for upstream of the Medical Center flows.

Per the Sharp Chula Vista Master Plan, the existing total Dry Weather Flow (DWF) from the site to the 10-inch sewer pipe located within Medical Center Court is estimated to be approximately 20,000 gallons per day (gpd). In Phases 2 and 3 of the proposed development, the future DWF addition of the New East Tower is estimated to add an additional 28,400gpd for a total flow rate of 48,400 gpd. In Phase 5 of the proposed development, the future DWF addition of the New West Tower is estimated to add an additional 28,400 gpd for a total flow rate of 76,800gpd (53.3gpm or 0.119cfs).

As noted previously, the Wastewater Master Plan did account for the entire Medical Center site to flow into the Telegraph Canyon basin. Utilizing the entire site area of 32.95 acres and the Institutional/Medical flow rate of 2,500 gal / day / acre, we are able to determine that the approved flow rate for the ultimate build out condition from the Medical Center site is 82,375gpd (57.2gpm or 0.127cfs).

Peak Sewer Flow Rates

For determining the ratio of Peak to Average sewage flow, for the purposes of sizing the onsite sewer pipes, it is necessary to determine the equivalent population based upon the flow rate. Using the total DWF rate of 76,800gpd and dividing it by 80 gal / capita / day, we get an equivalent population value of 960. Using this equivalent population and the Ratio of Peak to Average sewage flow vs. Magnitude of Tributary Population chart, we determine a peaking value of 2.5.

Offsite Sewer Calculation

Sharp Chula Vista Medical Center Court, Peak Wet Weather Flow of existing 10" sewer.
Existing sewer pipe within Medical Center Court varies from 0.4% to 10%.

Population Data

Proposed total flow rate = 76,800 gpd

Peaking Factor = 2.5 (per CVDS 18).

Total Peak Flow (Q) = 2.5 x 76,800 = 192,000 gpd (0.192 mgd)

1 gal/day = 1.5475 x 10e-6 cfs, therefore Q = 0.297 cfs

Pipe Characteristics

VC pipe, n=0.013

Diameter = 10"

Q = 0.297 cfs

Slope = 10.0%

$V = (1.486/n) \times R^{(2/3)} \times S^{(1/2)}$

Velocity = 6.8 fps > 2.0 fps and < 12 fps, therefore OK

dn/D = 0.12 < .50 , therefore OK

Pipe Characteristics

VC pipe, n=0.013

Diameter = 10"

Q = 0.297 cfs

Slope = 0.4%

$V = (1.486/n) \times R^{(2/3)} \times S^{(1/2)}$

Velocity = 2.05 fps > 2.0 fps and < 12 fps, therefore OK

dn/D = 0.29 < .50 , therefore OK

Conclusions

With the proposed Medical Center Expansion, the underlying proposed land use of the Sharp Chula Vista Medical Center as an Institution/Medical facility will remain unchanged. The approved City of Chula Vista Sewer Master Plan identified the entire 32.95 acre Medical Center site area as flowing into the Telegraph Canyon Basin sewer system. Calculations show that the approved DWF rate in the ultimate build out condition from the Medical Center site therefore would have been 82,375gpd. With the proposed expansion, we are anticipating a total flow rate of 76,800gpd which represents 93% of the ultimate build out flow rate.

Analysis of the onsite sewer system that is proposed as a part of the Medical Center Expansion shows that we would expect sewer pipe slopes ranging from 4% to 9.5%, velocities ranging from 3.5fps to 6.4fps, and depths of flow ranging from 14% to 19%.

Analysis of the existing sewer reaches within Medical Center Drive and Medical Center Court have confirmed that the existing 10" sewer lines with slopes ranging from 0.4% to 10.1% have adequate capacity to convey the anticipated wastewater flow rate of 76,800gpd (53.3gpm or 0.119cfs) with velocities ranging from 2.1fps to 5.1fps and depths ranging from 14% to 27%.

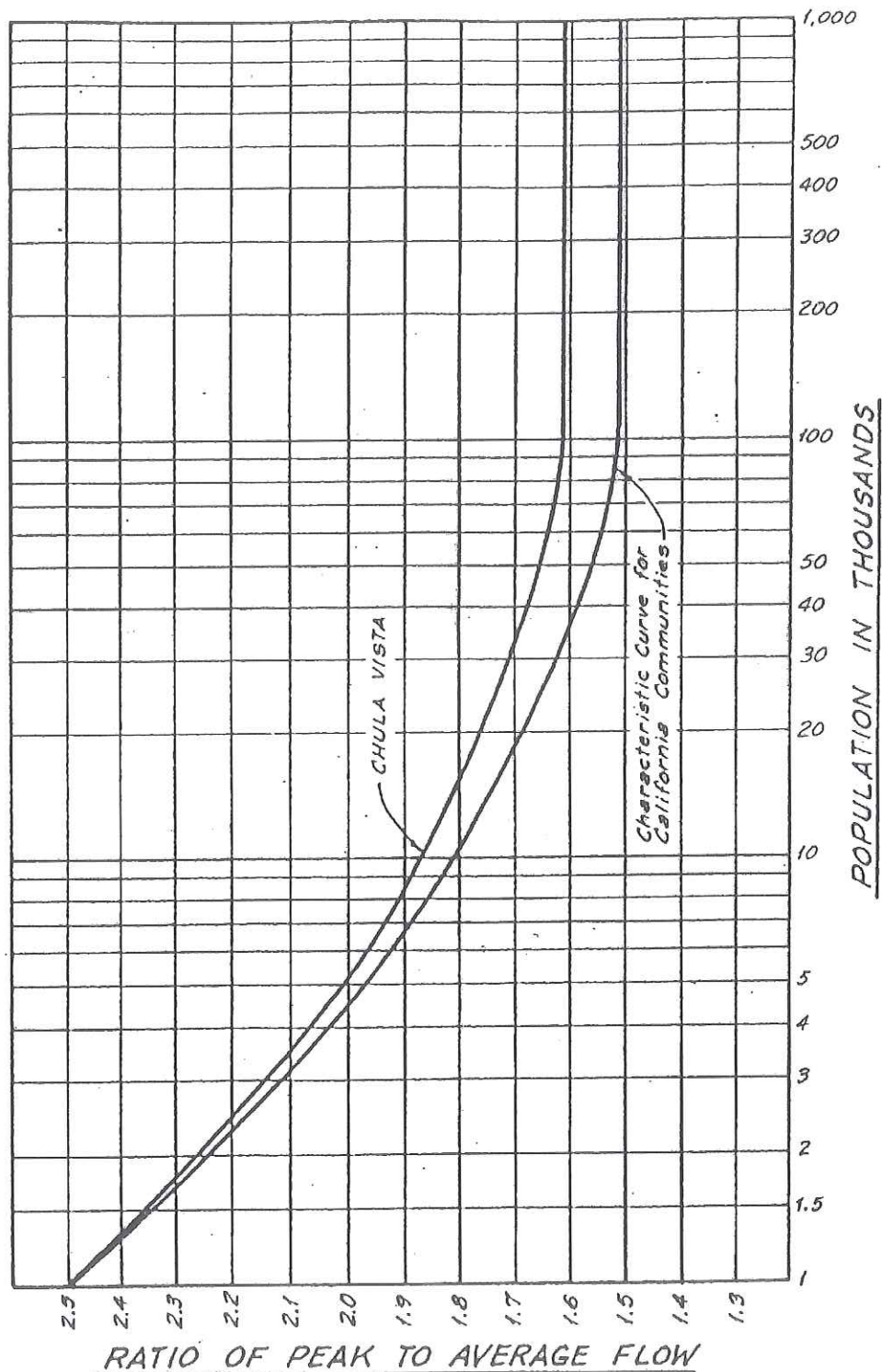
Appendix A

Proposed Design Spreadsheets

Appendix B

Reference Information

**RATIO OF PEAK TO AVERAGE SEWAGE FLOW
VS. MAGNITUDE OF TRIBUTARY POPULATION**



Revised	Drawn J.W.H. Date 10-10-72	CITY OF CHULA VISTA PUBLIC WORKS DEPARTMENT	
	Approved Date 8-18-78		
	<i>Clifford Stinson</i>	PEAK TO AVERAGE SEWER FLOW	CVD- SW01
	CITY ENGINEER Date: 11-7-02		

CHAPTER 7

SEWER SYSTEM STANDARDS AND EMERGENCY PROCEDURES

7.1 INTRODUCTION

This chapter summarizes the existing City of Chula Vista general sewer design criteria including, in particular, the specified methodology for determining design capacity, and provides recommended changes to the criteria based on findings of the Master Plan engineering evaluations and review of current industry standards. The chapter additionally includes a summary of the City's current emergency response procedures, including additional general response guidance.

Sewer design criteria are specified in the City's Subdivision Manual Section 3-300 (revised 7/1/2002), which is provided in Appendix N. The criteria include standards for design capacity calculation, gravity sewer design, and force main and pump station design. The City's emergency response procedures are given in the current *Sewer Overflow Response Plan* (January 2005), which is provided in Appendix O.

7.2 GENERAL SEWER DESIGN

Design Capacity

The design criteria for public sewers are based on residential (R1) zoning and land use with a density of 4 dwelling units per acre and 3.3 persons per dwelling unit.

Wastewater Generation

To ensure adequate capacity new sewers should be designed to convey peak wet-weather flows. As presented in Chapter 3 – Wastewater Generation, average dry-weather generation rates for single-family residences based on calibrated hydraulic models of the existing collection system ranged from 195 to 225 gpd/EDU. Using the high end of this range yields a dry weather generation rate of approximately 70 gpd per capita based on an average density of 3.3 people per dwelling unit. Applying a standard inflow and infiltration allowance of 10 percent to the dry-weather rate gives a recommended design unit generation rate of 77 gpd per person or approximately 250 gpd per EDU. Recommended generation rates for multi-family dwellings are based on an average density of 2.5 people per dwelling, which yields approximately 190 gpd per dwelling. Based on the City's desire to provide for a minimum flow from non-residential acreage equal to 10 EDUs, the design unit generation rate for non-residential development is

Sewer System Standards & Emergency Procedures

2,500 gpd per acre. These generation rates are consistent with the City's adopted design rates specified in the City Subdivision Manual. Table 7-1 provides the adopted design wastewater generation rates.

To account for the daily variations in the wastewater flow rate, the peak design flow rate within a specific reach of sewer is approximated by multiplying the total average flow rate in the reach by a factor specified in Chula Vista Design Standard (CVDS) 18. This peaking factor is a function of the total population draining to the reach.

**Table 7-1
Recommended Sewer Design Unit Generation Rates**

Land Use	Unit Generation Rate
Residential (R-1 and R-2)	265 gpd per dwelling unit
Residential (R-3 and MHP)	199 gpd per dwelling unit
Commercial/Industrial/Institutional	2,500 gpd per acre
Parks	500 gpd per acre
Elementary School	15 gpd per capita
Junior High and High School	20 gpd per capita

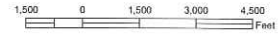
Sewer Design Capacity

Sewer design capacity will be based on the peak flow rate estimated by the unit generation rates specified in Table 7-1 and CVDS 18. Flow depths will be estimated by use of Manning's equation. Table 7-2 gives the hydraulic design criteria specified in the Subdivision Manual.

**Table 7-2
Hydraulic Sewer Design Criteria**

Parameter	Criteria
Peak flow depth to pipe diameter ratio (d/D)	0.50 for d ≤ 12-inches 0.75 for d > 12-inches
Manning 'n' factor	0.013 for VCP or RCP, d ≤ 21-inches 0.012 for VCP or RCP, d > 21-inches 0.012 for PVC, all sizes
Minimum velocity	2 feet/second
Maximum velocity	12 feet/second

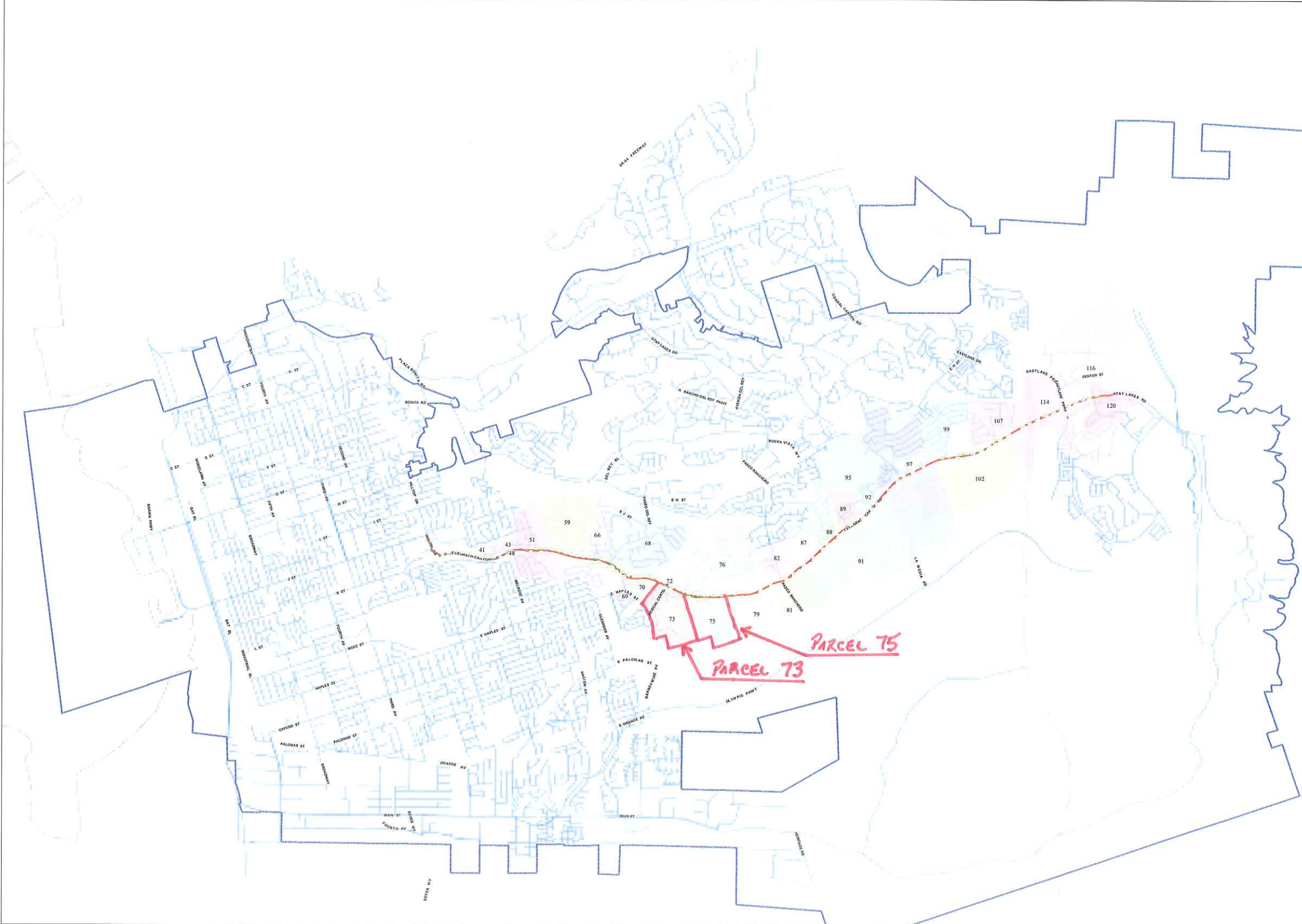
CITY OF CHULA VISTA
SEWER MASTER PLAN
TELEGRAPH CANYON MODEL MAP
EXHIBIT 2



1 inch equals 1,500 feet

Map Date:
January 26, 2009

Projection: State Plane
Datum: NAD 83
Zone: California VI
FIPS: 0416
Units: Feet



Legend

- Inflow Manholes
- Modeled Manholes
- Modeled Sewers
- Sewer Mains
- ▭ Parcels



2

ACCESS

The access to the site is currently from one road only: Medical Center Court. This road then connects back to Medical Center Drive, Telegraph Canyon Road, and ultimately to Interstate 805. There are 4 curb cut locations off of Medical Center Court: the most northerly entry is primarily used to access the lower level of the existing parking structure as well as exiting. The second entry point serves as the hospital main entry and walk-in emergency access. The third entry point serves as the ambulance access. The fourth entry point provides access to the outpatient facilities and service access to the loading and receiving area for the hospital.

EXISTING INFRASTRUCTURE

1. Electrical Service

The incoming normal electrical distribution to the facility is via an existing 12KV SDG&E service to an underground utility vault located along Medical Center Court. The system is routed underground in a utility easement along the existing street, terminating in the SDG&E utility vault. This existing electrical service is not adequate to support any major expansion to the campus.

2. Water Service

The existing water service provided from Medical Center Ct. is adequate for the medical centers future expansion.

Conditions	Units / Year	Total / Year
Existing Potable Water Usage	38,471	NA
-1 New 140 Bed Tower	17,371	56,112
-2 New 140 Bed Tower	34,742	73,483

3. Sewer Services

The existing sewer main is located in Medical Center Ct. The existing line is a 10" line. At the time of this report the full volume study and effect on the existing main line has not been completed.

Conditions	Gal/ons / Day	Gal/ons / Day
Existing Discharge to Sewer	20,000	NA
-1 New 140 Bed Tower	28,400	48,400
-2 New 140 Bed Tower	56,800	76,800





2 Current buildings:

The existing campus is made up of several structures: the main hospital, the west parking structure, Birch Patrick skilled nursing facility, 31 medical office buildings and the cancer center.

The current hospital was built in 2 major phases. The original hospital "East Tower" was built in 1974 for acute care and inpatient services. In 1991 the main hospital expanded adding the "West Tower" to increase bed capacity, expand emergency services and grow the maternity program. The chart below represents the

	BED COUNT		SQUARE FOOTAGE	
	EAST TOWER	WEST TOWER	EAST TOWER	WEST TOWER
1 st Level	0	NA	37,451	15,935
2 nd Level	7	0	38,212	32,347
3 rd Level	44	28	13,876	25,640
4 th Level	44	48	13,876	18,000
5 th Level	44	28	13,876	18,000
Sub Total	139	104	117,291	109,922
TOTAL	243		227,213	
Birch Patrick	100		37,923	
TOTAL	343		265,136	

EXISTING

5

BED ALLOCATION	MAKE READY				IMMEDIATE				FUTURE GROWTH				2030 COMPLIANCE PLAN			
	EXISTING		PHASE II		PHASE III		PHASE V		PHASE III		PHASE V		PHASE V			
	EAST TOWER	WEST TOWER	EAST TOWER	WEST TOWER	NEW EAST TOWER	EAST TOWER	WEST TOWER	NEW EAST TOWER	EAST TOWER	WEST TOWER	NEW EAST TOWER	WEST TOWER	NEW EAST TOWER	NEW WEST TOWER		
1ST LEVEL	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
2ND LEVEL	7	0	0	0	0	0	0	0	0	0	0	0	0	34		
3RD LEVEL	44	28	44	28	34	44	28	34	44	28	34	28	34	34		
4TH LEVEL	44	48	44	48		44	48	34	44	48	34	48	34	34		
5TH LEVEL	44	28	44	28		44	28	34	44	28	34	28	34	34		
SUBTOTAL	139	104	132	104	34	132	104	102	132	104	102	104	102	136		
TOTALS	253		270		338				342							

PLANNING CONCEPT: BED ALLOCATION

5



NEW EAST TOWER			FUNCTIONS	
FLOOR LEVEL	AREA			
LEVEL 1	27,893 S.F.		RECEIVING DOCK / DIETARY EXPANSION / CENTRAL STERILE / PHARMACY SHELL / MATERIALS MANAGEMENT / MOROQUE	
LEVEL 2	38,786 S.F.		NEW LOBBY / SERVERY & DINING / SURGERY EXPANSION (6) ORG / PRE-OP / PACU	
LEVEL 3	24,804 S.F.		(8) ICU BEDS / (26) TELEMETRY BEDS	
LEVEL 4	24,804 S.F.		(34) MED / SURG BEDS	
LEVEL 5	24,804 S.F.		(34) MED / SURG BEDS	
TOTAL	141,091 S.F.		(102) BEDS	

PLANNING CONCEPT: NEW EAST TOWER

5



2030 WEST TOWER			
FLOOR LEVEL	AREA	FUNCTIONS	
LEVEL 1	42,000 S.F.	FUTURE D&T EXPANSION	
LEVEL 2	24,804 S.F.	(34) MED / SURG BEDS	
LEVEL 3	24,804 S.F.	(34) MED / SURG BEDS	
LEVEL 4	24,804 S.F.	(34) MED / SURG BEDS	
LEVEL 5	24,804 S.F.	(34) MED / SURG BEDS	
TOTAL	141,216 S.F.	(136) BEDS	

PLANNING CONCEPT: 2030 WEST TOWER