MCS
Mission Consulting Services
WATER SYSTEMS SPECIALISTS

January 3, 2023

City of San Diego
Development Services Department –
Water and Sewer Development Review
9192 Topaz Way
San Diego, CA 92123

SUBJECT: **Sharp Metropolitan Medical Campus (SMMC) Modernization & Improvement Project – Sewer Study for Conditional Use Permit**

To Whom it May Concern:

We are pleased to submit this Sewer Study in support of the Conditional Use Permit (CUP) for the SMMC Modernization & Improvement Project (Project) for your review. The purpose of this Study is to document the existing and ultimate water systems necessary to provide wastewater service to the Project in support of the CUP.

I. INTRODUCTION

The Project is a 41-ac site located south of Frost Street and east of Health Center Drive in the City of San Diego (City). **Figure 1** presents the Project Location.

The Project includes building additions and demolitions to expand, update, and modernize the existing SMMC. The current land use associated with this area is institutional according to the Serra Mesa Community Plan (2017), and all uses proposed in the Project are consistent with that use type.

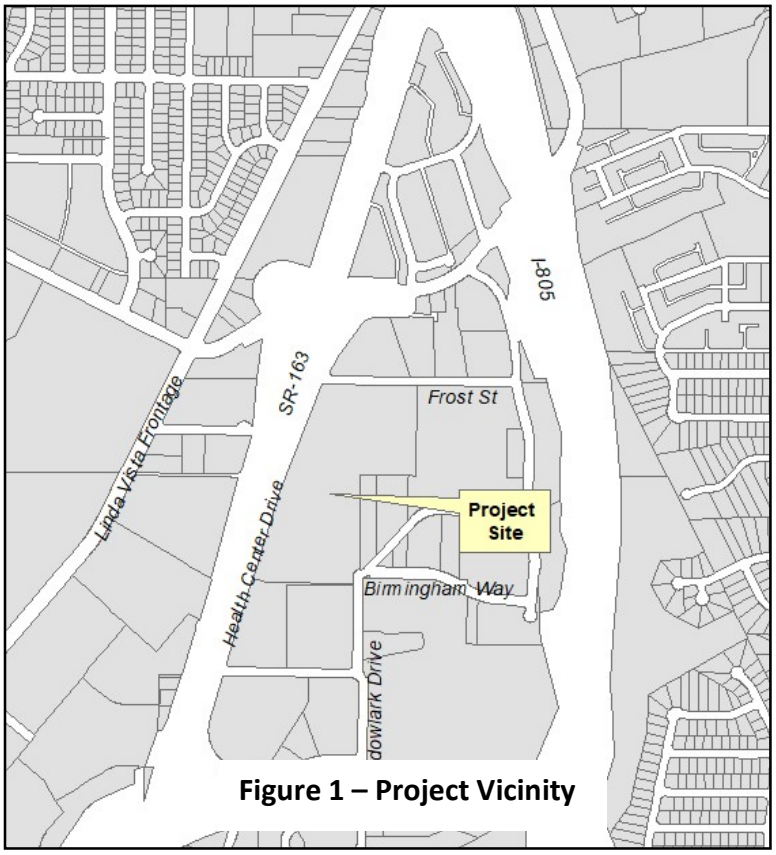


Figure 1 – Project Vicinity

II. WASTEWATER FLOW GENERATION

Typically for these types of projects the wastewater generation use would be determined using fixture counts and associated demands developed for the water system. However, the existing fixture units and water data cards for the site are not available. In the case for this Project, existing water billing data was received from the City for the previous three years, resulting in a rolling average annual demand (AAD) of 219,557 gpd (152.5 gpm). It is important to first note the potable water use for the Project before calculating the wastewater that could be generated. The City has also requested that the water use be equated to total bed count for the site. The existing bed count is 862, which results in a water use of 275 gpd/bed based on the recorded billing data.

The Administrative Building is the Knollwood Complex at the southeast corner of the project. This building is currently off a separate meter, the data for which has not been provided to date. In order to determine the water use for this building, the total project site demand was equated to square footage, which resulted in a water duty factor of 0.423 gpd/sf. Based on the existing building size shown in Table 1, the resulting water use for this building was determined to be 17,148 gpd (11.9 gpm) for a total Project water use of 236,705 gpd (164.4 gpm).

At the request of the City, the future water use for the Project was determined by the number of proposed beds. However, the Project is proposing a total decrease of 113 beds for a total projected bed count of 749. At this time, it is proposed that the estimated water use for the site remain consistent with currently recorded water use. There will be an increase in floor square footage that is due to a number of accumulative effects to include more room to provide patient care than was previously allocated in earlier architectural and code compliance practices, as well as a few meeting and training spaces to serve professional development of the staff already on site. Based on these factors, the water use projection is not anticipated to increase.

Assuming an industry standard 90-percent Return-To-Sewer (RTS) rate, the total site wastewater flows would be 213,025 gpd (148 gpm) average dry weather flow (ADWF). Using the City's wastewater unit generation rate of 80 gpdc, this equates to an equivalent population of 2,663 people. **Table 1** shows the revised distributed wastewater flows based on the projected future square footage of each building and the RTS associated with the water demands.

Table 1. Potable Water Use & Wastewater Generation

Building Name	Future Potable Use			Future Wastewater	
	Square Footage	AAD		ADWF	
		gpd	gpm	gpd	gpm
New PS					
Mary Birch	286,361	81,683	56.7	73,515	51.1
New Tower	251,240	71,665	49.8	64,498	44.8
Waste Dock	2,754	786	0.5	707	0.5
Linda Vista Trunk Sewer					
Central Energy Plant (SCS)	24,863	7,092	4.9	6,383	4.4
Connector Corridor (SCS)	5,335	1,522	1.1	1,370	1.0
Gravity to KMTS					
Central Engery Plant Mod.	6,481	1,849	1.3	1,664	1.2
New Concourse Entry	28,860	8,232	5.7	7,409	5.1
Main Hospital PS					
Sharp Main Hospital	-	-	-	-	0.0
Tower	103,901	29,637	20.6	26,674	18.5
Dietary Building	-	-	0.0	-	0.0
Service Building	-	-	0.0	-	0.0
ED Radiology	-	-	0.0	-	0.0
Temporary PS					
Administrative Building[1]	120,000	34,229	23.8	30,806	21.4
TOTAL	**829,795**	**236,694**	**164.4**	**213,025**	**147.9**

1) The Administrative Building (Knollwood) total square footage was not included in the calculation for gpd/sf as this building is served by a separate water connection.

CITY DESIGN CRITERIA

The City criteria used in this sewer study was obtained from the January 2015 City of San Diego Sewer Design Guidelines. The following list summarizes the specific criteria used for this analysis:

Table 2. 2015 City Sewer Design Criteria

Manning's "n" coefficient	0.013	
Maximum Flow Depth, d/D	0.5	≤ 15"
	75%	> 15
Cleansing Velocity, Minimum Desired	3	fps
Cleansing Velocity, Maximum Desired	5	fps
Maximum Allowable Velocity	10	fps

The City uses an equation to determine the ADWF to peak dry weather flow (PDWF) peaking factor, which is all included in the Appendix for reference. This methodology mirrors the water in that the larger the population, the lower the peaking factor.

Peak factor = 6.2945 (ADWF/80)^-0.1342

The overall Project PDWF peaking factor comes out to 2.18 using the 2,663 equivalent population referenced above. Therefore, the PDWF for the entire Project is 464,395 gpd (322 gpm). However, the site is split between the two main trunk systems – Kearny Mesa and Linda Vista.

III. Model Assumptions

The model was simulated under anticipated a PDWF condition. Key Model Assumptions are summarized below.

1. Boundary Conditions – Several previously conducted studies were used in conjunction with the proposed changes to determine the flows assumed in the original design of the system.
2. Elevations – Project elevations were obtained using both Google Earth and finished floor elevations for existing and proposed buildings.
3. Flows – As discussed in Section II, the existing potable water demands were obtained from recent billing records, and wastewater flows were extrapolated at a 90% RTS.
4. Roughness - Roughness coefficients were assumed at 0.013 for all pipelines.
5. Pumped Flows – All pumped flows are constant and are not peaked again. All pump stations shall pump the peak flow.

IV. EXISTING WASTEWATER SYSTEM

The existing wastewater collection system is a combination of small pump stations, force mains, emergency storage vaults, manholes, and gravity mains. Currently, the existing main hospital gravity

flows to a Main Hospital Pump Station (MHPS) and vault just west of the building which then pumps wastewater to a manhole north of the existing tower along Frost Street. From here, this portion of the system gravity flows along the north and east side of the main hospital and eventually drains into the existing 15-inch City-owned main. A small portion of the Project gravity flows to what is referred to as the Temporary Pump Station (TPS) at the intersection of Birmingham Way and Meadowlark Drive. The TPS pumps to the north and into the 15-inch main and eventually to the Kearny Mesa Trunk Sewer (KMTS). The remainder of the SMMC drains to the west into Health Center Drive and the Linda Vista Trunk Sewer (LVTS).

Prior studies conducted show a peak design flow of 76 gpm at the TPS, and 58 gpm at the MHPS.

The existing sewer system and approximate points of connection for each building are shown in **Figure 2**. Locations of building and sewer system connection points are approximate.

V. PROPOSED WASTEWATER SYSTEM

A simple spreadsheet hydraulic model was created to represent the existing system to determine what improvements are required due to the revised onsite building configuration. To the extent possible, existing wastewater facilities will be reused, but it may be necessary to reroute or eliminate pipeline where buildings will be located.

Due to elevation several proposed buildings are unable to flow by gravity into the existing TPS and require a new internal pump station, denoted as NEW PS. This NEW PS will take flow from the new Mary Birch Tower and addition and Waste Dock to a new wet well/vault and pump station just south of the loading dock. This NEW PS will pump through a new force main to the north and into the existing City-owned 15-inch main at a rate of 324,605 gpd PDWF (225 gpm).

The Project Team has developed plans for the internal pipe configuration and potential facility locations, such as manholes and cleanouts. This analysis uses the proposed piping layout, wastewater flows, and criteria developed in the above sections to analyze the system. **Figure 3** presents the ultimate wastewater system used to analyze the Project. Locations of building and sewer system connection points are approximate.

In addition, Rady Children's Hospital to the east is also redeveloping their site and intends to send additional wastewater flows by gravity into the existing 15-inch main to their south. These flows currently gravity to Childrens Way and south into the KMTS. Several buildings and a rerouting of the wastewater mains will put these flows directly into the existing 15-inch. These flows were received from Rady's project team and have been added to MH-244, for a total ADWF from Rady of 52,698 gpd and MH-242 of 9,917 gpd. ADWF is presented on Figure 3 as these flows are peaked on a cumulative, not on an individual, basis.

MODEL RESULTS

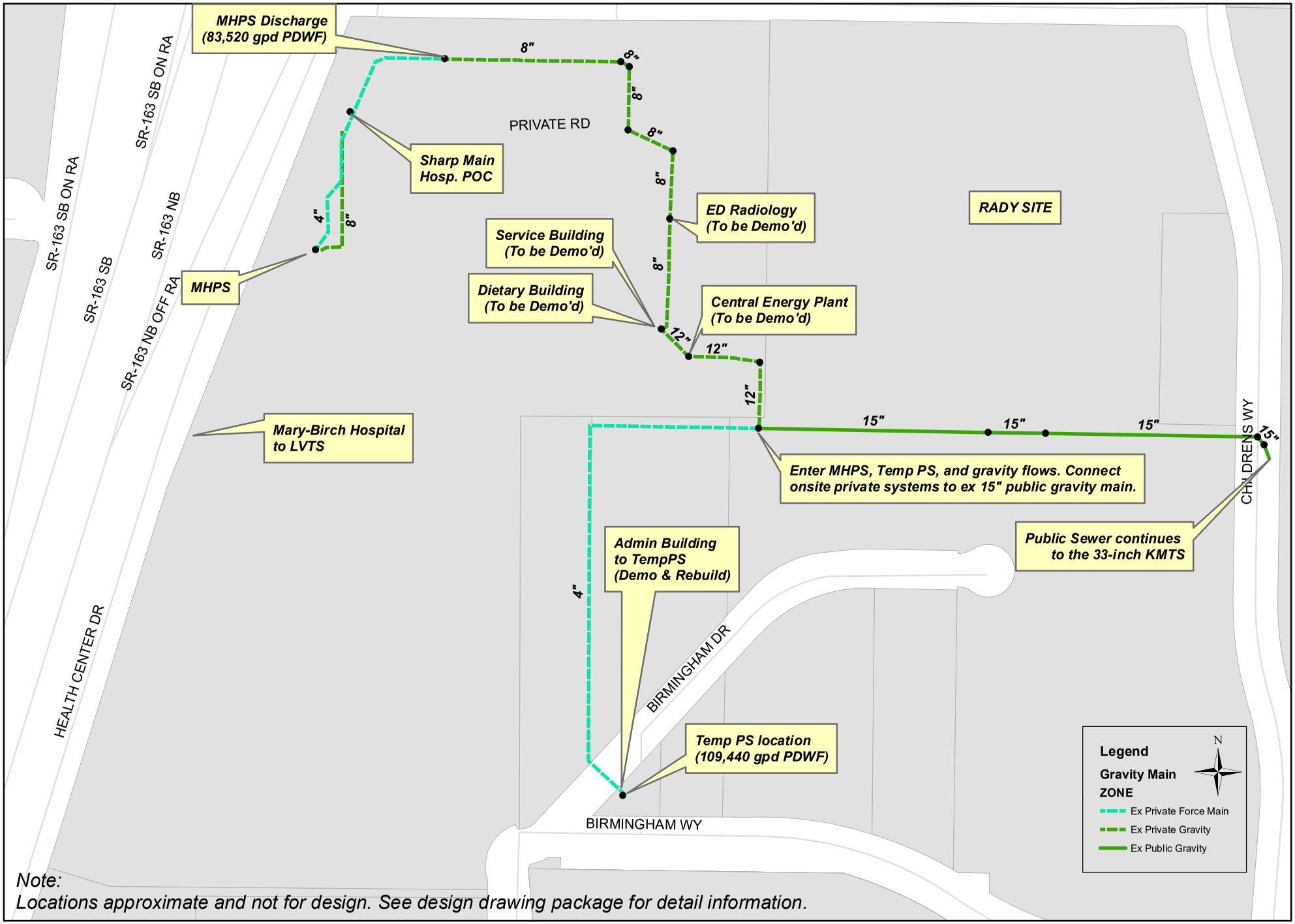
The results of the modeling are shown in **Appendix B**. The results show that the onsite private system and downstream reaches of the City's existing system have adequate capacity to serve the revised Project, as well as additional flows from Rady's project. The system as shown on Figure 2 will support the ultimate conditions proposed by the Project and no additional or offsite improvements are necessary. The maximum d/D for the existing City of San Diego system is 0.48 at P-11 for the ultimate condition. Also, this includes the diverted flows from the TPS that would eventually be redirected back to the LVTS, thus freeing up capacity in the existing 15-inch and onsite Sharp systems.

Please feel free to call me should you have any questions.

Respectfully Submitted,

Jennifer R. Mael, P.E.
Project Manager

Attachments:
Figure 2 – Existing Sewer System
Figure 3 – Ultimate Sewer System
Appendix A – Supporting Documentation
Appendix B – Model Results



Note:
Locations approximate and not for design. See design drawing package for detail information.

FIGURE 2 - EXISTINTG SEWER SYSTEM

Sharp Metropolitan Medical Campus (SMMC) Modernization & Improvement Project - Sewer Study for Conditional Use Permit

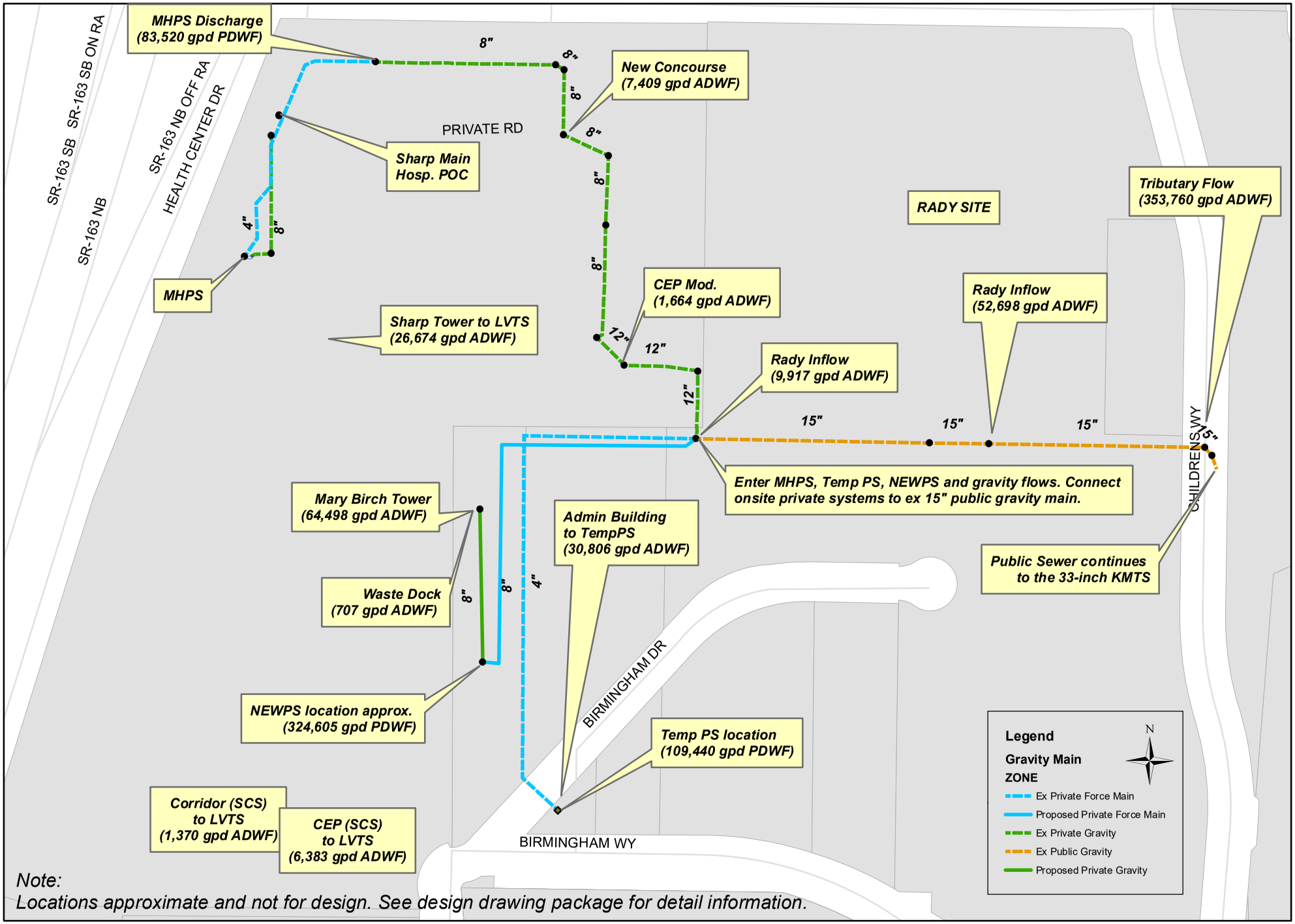
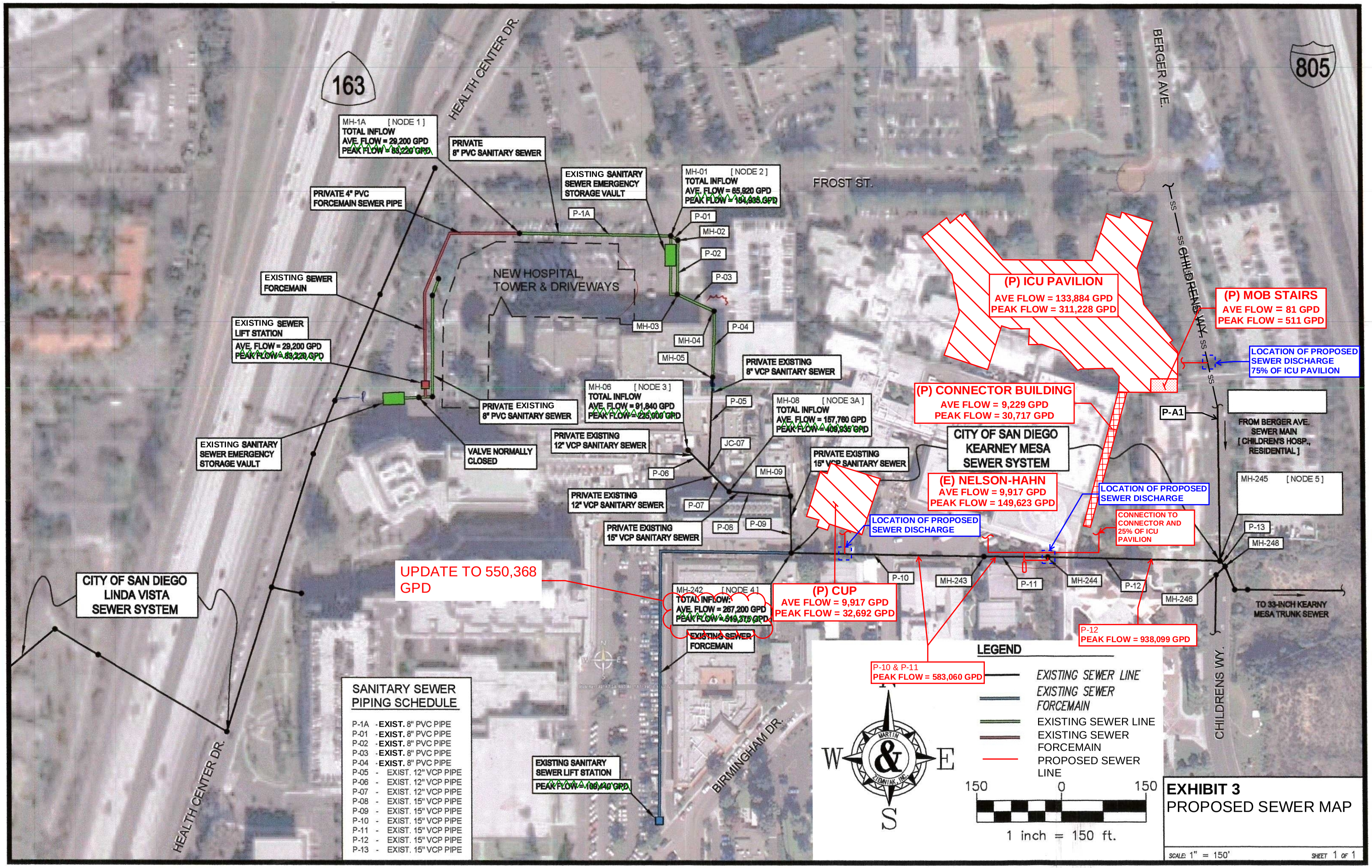


FIGURE 3 - ULTIMATE SEWER SYSTEM

Sharp Metropolitan Medical Campus (SMMC) Modernization & Improvement Project - Sewer Study for Conditional Use Permit

APPENDIX A – SUPPORTING DOCUMENTATION



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SHARP Memorial Hospital Modernization Project

FINAL SANITARY SEWER STUDY

WO# 422832

Prepared By:
Martin & Ziemniak
7576-B Trade Street
San Diego, CA 92121
(858) 831-9420

March 29, 2007

THE CITY OF SAN DIEGO

March 29, 2007

Mr. Andrew Ziemniak, PE
Martin & Ziemniak
Civil Engineering & Land Surveying
7576-B Trade St.
San Diego, CA 92121

Dear Mr. Ziemniak:

Subject: Sharp Memorial Hospital Modernization Project (W.O. 42-2832)

We have received the master sewer study dated March 29, 2007 which was received by our office on March 29, 2007. The sewer study is accepted by the Development Section of Metropolitan Wastewater Department.

If you have any questions or require any additional information please call me at (61)533-5106 or Assistant Engineer Alejandro Ruiz at (619) 235-1991.

Sincerely,

BARBARA A.B. SALVINI
Senior Civil Engineer

AR

cc: Chris Toth, Deputy Director, Metropolitan Wastewater Department
Ann Sasaki, Deputy Director, Metropolitan Wastewater Department
Robert Ferrier, Assistant Director, Metropolitan Wastewater Department
Isam Hireish, Senior Civil Engineer, Metropolitan Wastewater Department
Hushmand Yazdani, Associate Engineer-Civil, Metropolitan Wastewater Department
Mehdi Rastakhiz, Associate Engineer-Civil, Metropolitan Wastewater Department
Alejandro Ruiz, Assistant Engineer-Civil, Metropolitan Wastewater Department
Bill Tripp, DPM, Development Services Department
Lou Smith, Vice President, Facilities Management & Developmeent, Sharp, 3475 Kenyon St., San Diego, CA 92110
Timothy Jacoby, Senior Managing Director, Facilities/Plant Operations/Planning, Children's Hospital & Health Center, MC5044, 3020 Children's Way, San Diego CA 92123

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ATTACHMENTS

REFERENCES

- City of San Diego Metropolitan Wastewater Department's *Sewer Design Guide* (2004)
- *Temporary Sewer Pump Station Study for the Women's Center Expansion and Medical Office Building at the Sharp Hospital Site* (August 1990)
- *Preliminary Master Sewer Study Including Children's Hospital Complex, Medical Offices and Residential Development in the Serra Mesa Community, San Diego, CA (W.O. 426012)* (August 2006)

Sharp Hospital - Skilled Nursing Tower Replacement Project
SANITARY SEWER STUDY

Project Location and Purpose

The Sharp Hospital Skilled Nursing Tower Replacement Project is located at 7901 Frost Street in the City of San Diego, 92123. The existing site is located within the southeasterly quadrant of the intersection of Health Center Drive and Frost Street, east of Highway 163. See Exhibit A at the end of this Report for a vicinity map. The purpose of the project is to replace the outdated ten-story nursing tower that does not meet current Office of Statewide Health and Planning and Development (OSHPD) code requirements with a new seven-story nursing tower that is to be attached to the existing two-story hospital building.

The purpose of this Study is to quantify expected sewage production due to the proposed Sharp Hospital development, examine impact to the existing sanitary sewer infrastructure and determine what, if any, additional sanitary sewer infrastructure will be required to accommodate the subject development.

Existing Sanitary Sewer System

Sewage generated at the existing Sharp Hospital Skilled Nursing Tower and surrounding site is collected though various sized sewer laterals that ultimately discharge through 8-inch, 12-inch and 15-inch private sewer vitrified clay pipe (VCP) to the west end of a 15-inch City of San Diego sewer main tributary to the Kearney Mesa Trunk Sewer. See Exhibit B – Existing and Proposed Sanitary Sewer Map located at the back of this Report. The City owned public 15-inch sewer main, constructed within a 10-foot wide sewer easement, originates approximately 800 feet west of Children's Way, southeast of the existing hospital site at manhole No. 242 (as defined on City of San Diego's Sewer Field Book G14S). Sewage flows from the existing hospital site enter manhole No. 242 from the north. Estimated peak sewer flow developed from the existing Sharp Hospital site is 225,000 gallons per day (GPD) as shown at manhole No. 06 on Exhibit B – Existing and Proposed Sanitary Sewer Map. See Exhibit C – Sharp Hospital Vicinity Land Use and Area Map and Appendix A – Sanitary Sewer Flow

Calculations for a summary of sewer flow computations along with a map indicating delineation of sewer system tributary areas. The amount of sewage shown in this report from the existing Sharp Hospital Site is considerably less than those indicated in the Preliminary Master Plan Sewer Study that indicated Children's Hospital Complex, Medical Offices and Residential Development in Serra Mesa County, San Diego, California, (w.o.426012) dated August 10, 2006by Project Design Consultants took a conservative approach and they assumed all of the Sharp Hospital Site was going east to the Kearny Mesa Trunk Line Sewer when in reality it is not. The existing Women's Center and Outpatient Pavilion along with a portion of other existing minor buildings are going west to the Linda Vista Trunk Line Sewer. See the actual existing condition calculations sewage flows going to the Kearny Mesa Trunk line Sewer in Appendix B of this report. In addition, sewage discharge from an existing sewer pump station constructed to divert sewage flows equivalent to those developed by the Women's Center Expansion and Medical Office Building from the City's sewer main in Birmingham Drive enter manhole No. 242 from the west. Based upon the *Temporary Sewer Pump Station Study for the Women's Center Expansion and Medical Office Building at the Sharp Hospital Site* prepared by John Powell & Associates in August 1990, the pumped peak flow is 76 gallons per minute (GPM) or 109,440 GPD. The combined sewer flows are conveyed from manhole No. 242 approximately 340 feet easterly through 15-inch VCP to manhole No. 243. From manhole No. 243, the sewage wastewater continues to flow easterly through 15-inch VCP to manhole No. 244, located 112 feet east of manhole No. 243. Approximately 300 feet further east, downstream of manhole No. 244, the 15-inch sewer main conveys flows to manhole No. 245, located within the Children's Way right-of-way, where the easterly flowing 15-inch sewage pipe combines with 605,976 GPD of peak sewer flows originating from the north and surrounding vicinity flowing southerly in an existing 15-inch sanitary sewage collector pipe along Berger Avenue and Children's Way to manhole No. 245. Peak sewer flows originating north of manhole No. 245 are based upon computations provided in the *Preliminary Master Sewer Study Including Children's Hospital Complex, Medical Offices and Residential Development in the Serra Mesa Community, San Diego, CA (W.O. 426012)* dated August 10, 2006, by Project Design Consultants and are included herein. See further discussion in the 'Proposed Sanitary Sewer System Improvements' section of this Report. The 940,424 GPD of combined peak wastewater flows entering manhole No. 245 discharge southeast through 15-inch VCP and continue easterly within the I-805 right-of-way to 33-inch VCP Kearney Mesa Trunk Sewer along the east side of I-

805. According to conclusions provided in the accepted Preliminary Master Sewer Study by Project Design Consultants referenced above, the Kearny Mesa Sewer System from manhole No. 248 (sewer manhole No. 3 per City of San Diego Construction Drawing 19072-2D) to the 33-inch Trunk Sewer provides adequate capacity for all anticipated Campus built-out conditions assumed to occur within the next eight years and meets City performance standards as depicted in the City of San Diego - Metropolitan Wastewater Department's *Sewer Design Guide (2004)*. Therefore, the intention of this Sewer Study is to verify that the existing 15-inch sewer main tributary to manhole No. 248 provides sufficient capacity to convey existing and proposed sewer flows while meeting design requirements of the previously referenced City of San Diego Sewer Design Guide.

Based upon hydraulic modeling computations using Haestad Methods, SewerCAD® Version 5.6 software, the maximum d_n/D achieved within the City of San Diego's above described sewer main between manhole No. 242 and manhole No. 248 resulting from the existing peak sewer load conditions is 0.32, occurring within pipe No. 13, well below the maximum allowed d_n/D of 0.5. However, the minimum average pipe velocity is 1.33 feet per second (fps) and occurs within pipe No. 11. In addition, pipe No. 10 achieves an average pipe velocity of 1.63 fps, also being less than what the City of San Diego requires for minimum velocity within a gravity sewer pipeline (2.0 fps). Therefore, due to the constructed pipe slopes of the sewer infrastructure serving the Hospital area, the existing condition does not meet the desired cleansing velocity for such facilities. See Appendix B – Sharp Hospital Existing Sewer Study Summary located at the back of this Report.

Proposed Sanitary Sewer System Improvements

In order to accommodate the Sharp Hospital Skilled Nursing Tower Replacement Project, new sewer infrastructure, including two 8-inch gravity collection sewers, one sewer lift station and a sewer forcemain will be constructed to convey wastewater flows to the City of San Diego's collection main leading to the Kearny Mesa Trunk Line sanitary sewer system. Originally, Sharp Hospital intended to distribute a portion of the sewer flows from the site westerly to the City of San Diego's Linda Vista Trunk Sewer System, and a portion of the improved sites sewage, easterly to the Kearney Mesa

Sewer System. However, further analysis of the Linda Vista Sewer System revealed that no capacity for additional wastewater flows without extensive sewer infrastructure rehabilitation or replacement is feasible. Therefore, the Hospital's onsite sewage collection system has been modified to convey all flows easterly to the Kearney Mesa Trunk Sewer Line located east of the Sharp Hospital site.

Along the western side of the proposed Hospital Skilled Nursing Tower an on-site private 8-inch polyvinyl chloride (PVC) sewer line will collect wastewater from 4-inch and 6-inch laterals and discharge southerly to a sewer lift station located south of the Hospital's driveway entrance at Health Center Drive. See Exhibit B – Sharp Hospital Existing and Proposed Sanitary Sewer Map, located at the back of this Report. The private sewer lift station will operate utilizing a sewage grinder plus duplex submersible sewage pumps with non-clog impellers coupled to a ½ horsepower (HP), 1750 RPM, 480 volt, 3-phase, 60 Hz motor capable of pumping 58 GPM (83,220 GPD) of peak sewer flow to 14 feet of head. The lift station's discharge line will be routed to a new on-site sewer manhole (manhole No. 1A) located at the north side of the new Hospital Tower. From manhole No. 1A, these diverted sewer flows combine with additional peak sewer flows of 101,715 GPD from various intersecting laterals coming from the new building addition and are conveyed easterly through a private 8-inch PVC gravity sewer line to manhole No. 01. The additional segments of proposed 8-inch PVC gravity private sewer pipeline continue southerly, connected by manhole's No. 02, 03, 04 and 05, to a point-of-connection (located at the southeast corner of the existing hospital site) with the Hospital's existing 8-inch VCP sewer. From the point-of-connection at manhole No. 05, the combined 184,935 GPD of new peak sewer flow discharges southerly and confluences with existing flows produced at the hospital site within the existing private 12-inch VCP. See Appendix A – Sanitary Sewer Flow Calculations for a summary of sewer flow computations. Sewer flows continue southeast through an existing private 15-inch VCP to manhole No. 08, then turn and flow easterly to existing manhole No. 09. At manhole No. 09 the flow turns to the south and are routed to the City of San Diego's manhole No. 242, described above. From existing manhole No. 242, the existing and new Tower sewage flow peak of 409,935 GPD combine with the sewage pump station flow from Birmingham Drive having a peak flow of 109,440 GPD per the existing sanitary sewer system as previously described above to result in a total peak flow of 519,375 GPD. From existing manhole No. 242 easterly the sewage will flow through existing manholes No. 243 and No. 244 as previously described above to manhole No.

245. The 519,375 GPD developed within the tributary area west of manhole No. 245 combine with a peak sewer flow of 721,671 GPD developed within the tributary area north of manhole No. 245 to produce a peak sewer discharge of 1,241,046 GPD. Flow computations for sanitary sewer flows originating north of manhole No. 245 are based upon analysis provided in the accepted *Preliminary Master Sewer Study Including Children's Hospital Complex, Medical Offices and Residential Development in the Serra Mesa Community, San Diego, CA (W.O. 426012)* dated August 10, 2006, by Project Design Consultants. Please note that all existing and future sewer flows produced within the Children's Hospital area (adjacent to Children's Way) discharge easterly to the 15-inch sewer main located within Children's Way and thus are tributary to the sewer pipe north of manhole No. 245 and have been included in flow calculations provided herein indicated at Node 5 in Exhibit B. See Appendix A – Equivalent Population and Sanitary Sewer Flow Calculations at the back of this Report for computations for determining average and peak sewer flows for the areas tributary to the north of manhole No. 245. Further, Project Design Consultant's Master Sewer Study conservatively assumed that the entire Hospital Zone, including Sharp Hospital, Children's Hospital, Mary Birch Center, Outpatient Pavilion Building (O.P.P.) etc., as well as surrounding residential and commercial areas, discharge southerly and easterly into the 15-inch sewer main that ties into the Kearney Mesa Trunk Line Sewer east of the I-805. However, that Master Sewer Study did not clearly identify how these flows were routed to the confluence point (manhole No. 248) but only verified adequate capacity of the City's sewer system downstream from the confluence point. In addition, it has been shown herein that the entire Hospital Zone defined by Project Design Consultant's Master Sewer Study is not tributary to the easterly 15-inch sanitary sewer main that ties into the Kearney Mesa Trunk Line east of I-805, but in fact, a significant portion of the wastewater flows, including that from Mary Birch Center and Outpatient Pavilion Building (O.P.P.), discharge westerly to the Linda Vista Sewer System. Therefore, the analysis provided herein demonstrates a more accurate accounting of peak flows tributary to manhole No. 245 and 248 and is based upon the land use methodology consistent with that used by Project Design Consultants in their Master Sewer Study. Sewer flows originating from the south of manhole No. 248 have not been evaluated in this Study, however, they are not considered to have significant impact to the performance of existing sewer infrastructure.

Based upon hydraulic modeling computations using Haestad Methods, SewerCAD® Version 5.6 software, the maximum d_n/D achieved within the City of San Diego's above described sewer main between manhole No. 242 and manhole No. 248 resulting from the existing and proposed sewer load conditions is 0.35, representing a 9% increase within pipe No. 13, yet below the maximum allowed d_n/D of 0.5. Moreover, the minimum average velocity is 1.5 feet per second (fps) occurring within pipe No. 11, which actually provides an 11% increase from the existing condition. In addition, the average velocity within pipe No. 10 increases from below 1.63 fps to 1.84 fps for the proposed condition. See Appendix C – Sharp Hospital Proposed Sewer Study Summary located at the back of this Report.

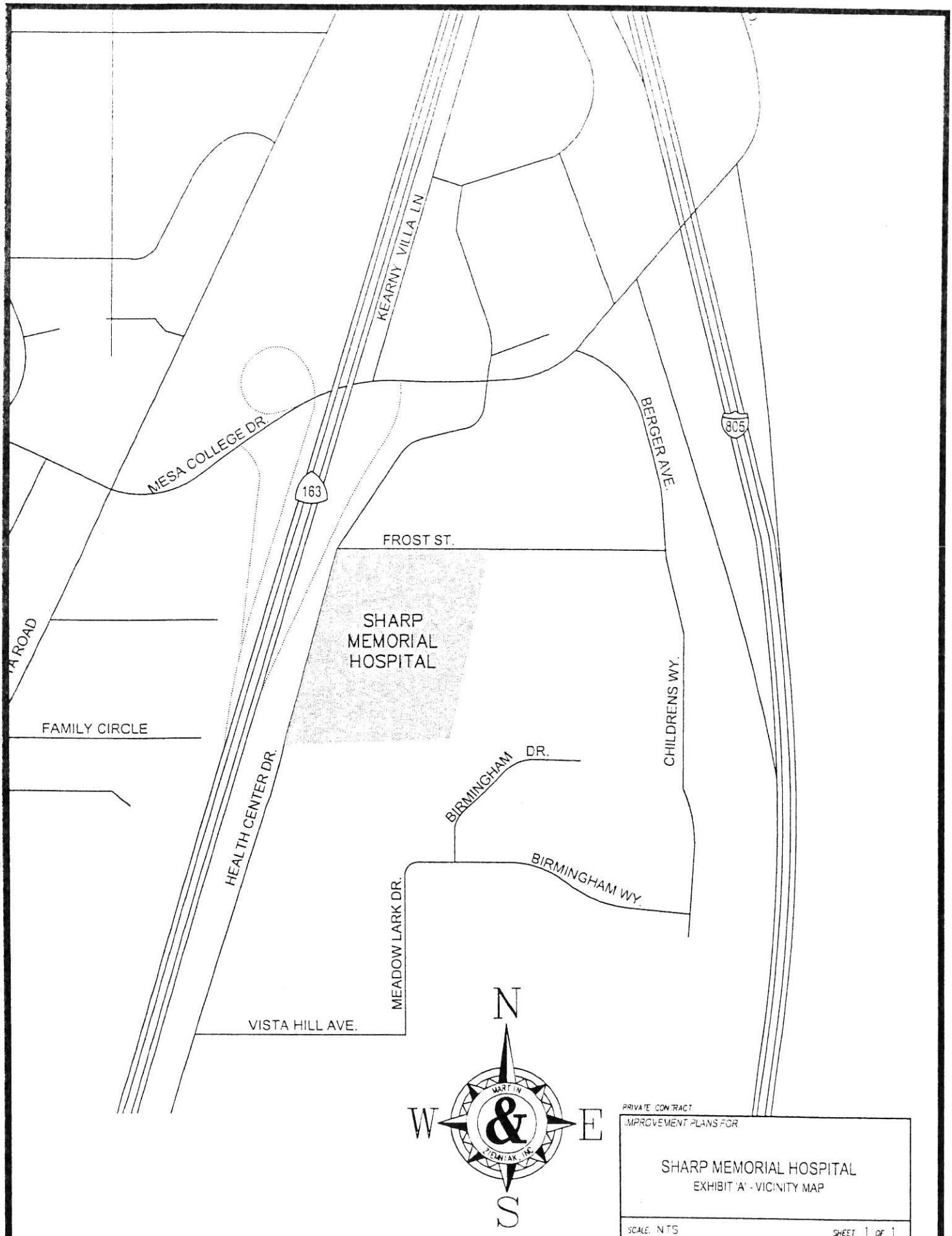
Conclusions

Based on the analysis, the 15-inch sewer infrastructure from existing sewer manhole No. 242 to manhole No. 248 (sewer manhole No. 3 per City of San Diego Construction Drawing 19072-2D) provides sufficient capacity to receive additional sewer flows from the proposed Sharp Hospital Skilled Nursing Tower Replacement Project. The project will increase peak sewer flows from 225,000 GPD to 409,935 GPD, which represents a 45% increase based upon the land use method of quantifying anticipated sewer demands tributary to the subject sewer main. However, impact to the public sewer infrastructure due to the 45% sewer load increase is limited as the maximum d_n/D increase only rises 0.08 from 0.29 to 0.37, a 22% increase occurring within pipe No. 10. In addition, in accordance with Section 1.3.3.1 of the City of San Diego's Sewer Design Guide the minimum average flow velocity within the sewer main should be greater than or equal to 2.0 fps. However, as detailed above, the existing condition results in sewer flows that fall below 2.0 fps within two reaches of the public sewer pipeline (pipe No. 10 and pipe No. 11). However, as a result of the added flow condition, proposed by this Study, the existing condition improves as the pipe velocities for these two reaches increase, although they still fall below the minimum flow velocity of 2.0 fps, even for the proposed condition. Yet this is an existing condition and no improvements for this existing condition, due to previously constructed pipe slopes, are proposed by this Study.

As stated previously, according to the *Preliminary Master Sewer Study Including Children's Hospital Complex, Medical Offices and Residential Development in the Serra Mesa Community, San Diego, CA (W.O. 426012)* dated August 10, 2006, by Project Design Consultants, the downstream portions of sewer infrastructure have enough capacity to receive the sewer flows identified by this Study. Therefore, the proposed sewer improvements and existing public sewer infrastructure capable of serving all conditions identified by this Sewer Study.

EXHIBIT A

Sharp Hospital Vicinity Map



PRIVATE CONTRACT

IMPROVEMENT PLANS FOR

SHARP MEMORIAL HOSPITAL

EXHIBIT 'A' - VICINITY MAP

SCALE: NTS

SHEET 1 OF 1

EXHIBIT B

Sharp Hospital Existing and Proposed

Sanitary Sewer Map

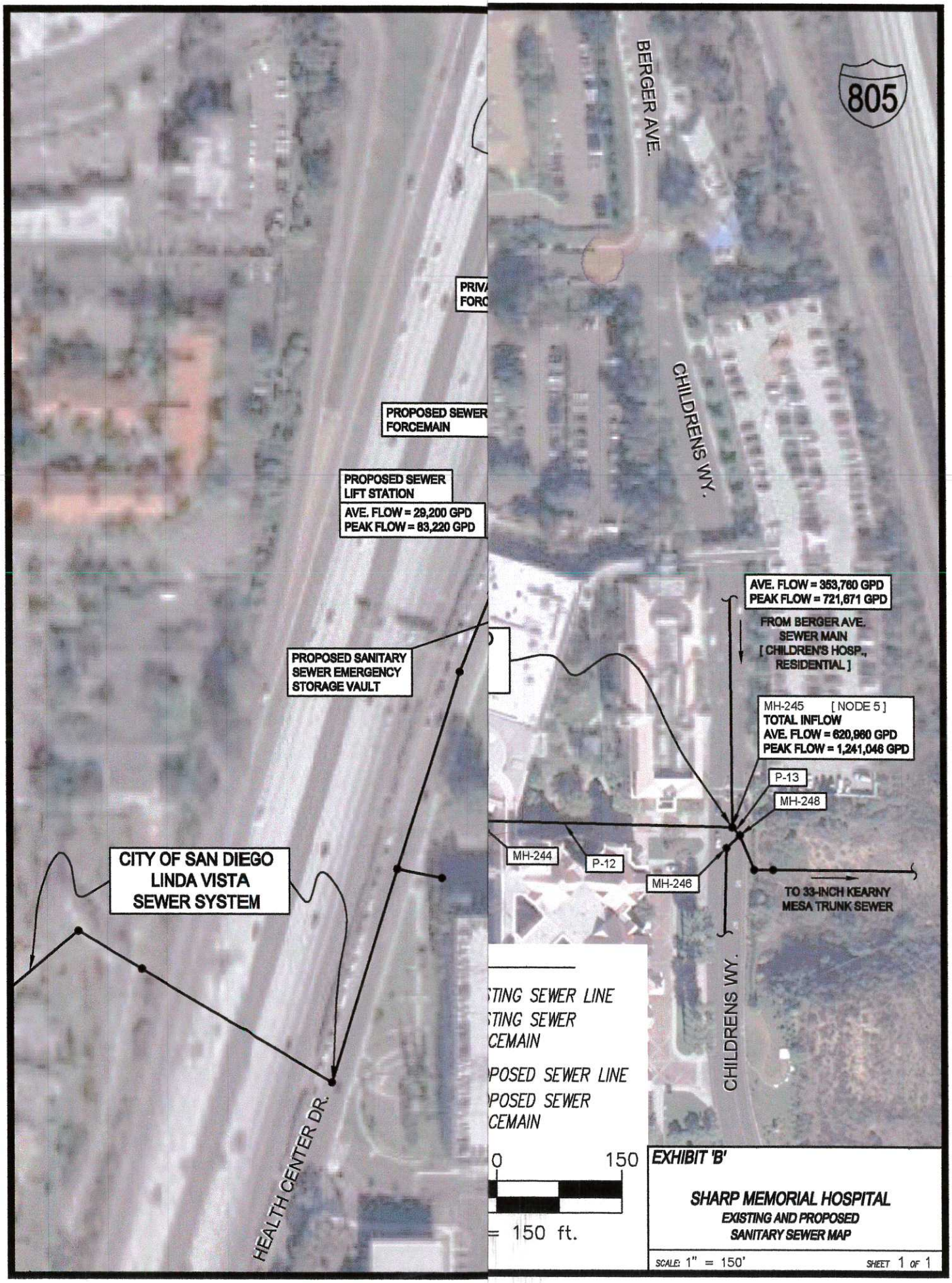


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EXHIBIT C

Sharp Hospital Vicinity Land Use and Area Map

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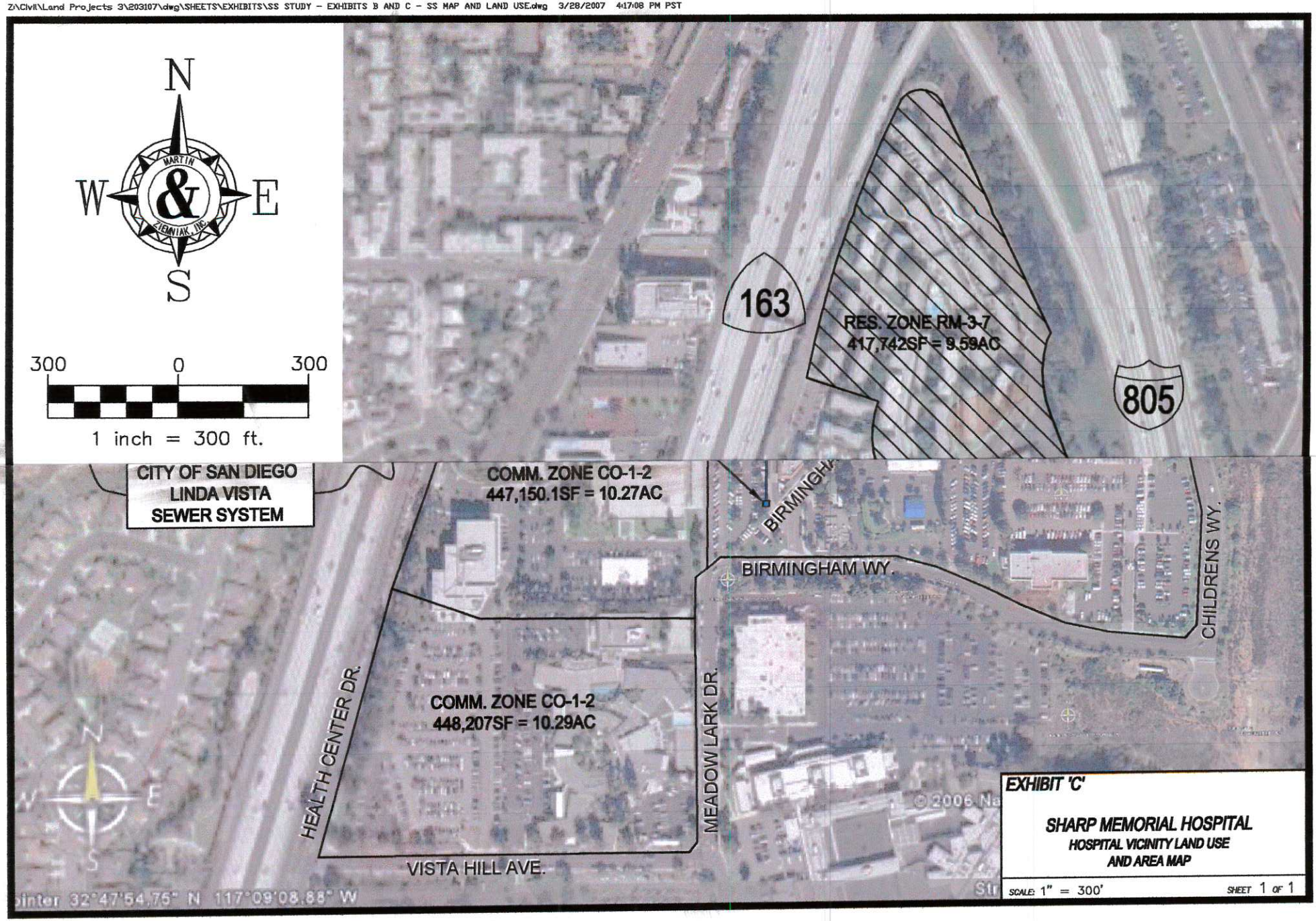


APPENDIX A

Equivalent Population and Sanitary Sewer Flow Calculations

SHARP HOSPITAL MODERNIZATION PROJECT SEWER STUDY
KEARNEY MESA SYSTEM TRIBUTARY SEWER FLOW CALCULATIONS
[TRIBUTARY AREA WEST OF MH-245]

PROPOSED PROJECT DATA

PROPOSED SHARP HOSPITAL AREA CO-1-2		1.62	ACRES
(MODERNIZATION PROJECT)	X	1.5	FLOOR AREA RATIO (F.A.R.)
	=	2.43	ACRES (INCLUDES ALL FLOORS)
EXISTING SHARP HOSPITAL AREA CO-1-2		5.1	ACRES
	X	1.5	FLOOR AREA RATIO (F.A.R.)
	=	7.65	ACRES (INCLUDES ALL FLOORS)
EXISTING WOMEN'S CENTER & MOB AREA CO-1-2			
*(PER JOHN POWELL PUMP STATION STUDY, AUG. 1990)			
		109440	GPD
PROPOSED SHARP HOSPITAL AREA CO-1-2		2.04	ACRES
(MODERNIZATION PROJECT)	X	1.5	FLOOR AREA RATIO (F.A.R.)
	=	3.06	ACRES (INCLUDES ALL FLOORS)

EQUIVALENT POPULATION CALCULATIONS

PROPOSED RESIDENTIAL EQUIVALENT POPULATION

LABEL	SWR. TABLE 1-1 ZONE PER CITY ZONING	AREA (ACRES)	POP/NET ACRE	EQUIVALENT POPULATION	EQUIVALENT POPULATION (ROUNDED UP)
PROP HOSP.	HOSPITAL	2.43	150	364.5	365
				SUBTOTAL POP.	365

PROPOSED RESIDENTIAL EQUIVALENT POPULATION

LABEL	SWR. TABLE 1-1 ZONE PER CITY ZONING	AREA (ACRES)	POP/NET ACRE	EQUIVALENT POPULATION	EQUIVALENT POPULATION (ROUNDED UP)
EXIST HOSP.	HOSPITAL	7.65	150	1147.5	1148
				SUBTOTAL POP.	1148

PROPOSED RESIDENTIAL EQUIVALENT POPULATION

LABEL	SWR. TABLE 1-1 ZONE PER CITY ZONING	AREA (ACRES)	POP/NET ACRE	EQUIVALENT POPULATION	EQUIVALENT POPULATION (ROUNDED UP)
PROP HOSP.	HOSPITAL	3.06	150	459.0	459
				SUBTOTAL POP.	459

PROPOSED PEAK FLOW CALCULATIONS

NODE 1

AVERAGE FLOW

= TOTAL EQUIV. POP. X 80 GPD
= 365 X 80 GPD
= 29200.00 GPD

PEAK FACTOR

= 6.2945 x (EQUIV. POP.) ^ (-0.1342)
= 2.85

PEAK FLOW

= PEAK FACTOR x AVERAGE FLOW
= 83220.0 GPD
= 0.13 CFS

NODE 2

AVERAGE FLOW

= TOTAL EQUIV. POP. X 80 GPD
= 459 X 80 GPD
= 36720.00 GPD

PEAK FACTOR

= 6.2945 x (EQUIV. POP.) ^ (-0.1342)
= 2.77

PEAK FLOW

= PEAK FACTOR x AVERAGE FLOW
= 101714.4 GPD
= 0.16 CFS

NODE 3

AVERAGE FLOW

= TOTAL EQUIV. POP. X 80 GPD
= 1148 X 80 GPD
= 91840.00 GPD

PEAK FACTOR

= 6.2945 x (EQUIV. POP.) ^ (-0.1342)
= 2.45

PEAK FLOW

= PEAK FACTOR x AVERAGE FLOW
= 225008.0 GPD
= 0.35 CFS

NODE 4

PEAK FLOW* = 109440.0 GPD
= 0.17 CFS

SHARP HOSPITAL MODERNIZATION PROJECT SEWER STUDY
KEARNEY MESA SYSTEM TRIBUTARY SEWER FLOW CALCULATIONS
[TRIBUTARY AREA NORTH OF MH-245]

PROPOSED PROJECT DATA

PROPOSED RES. SITE AREA RM-3-7		9.59	ACRES
PROPOSED RES. SITE AREA RM-4-10		0.13	ACRES
PROPOSED COMMERCIAL SITE AREA CO-1-2		5.37	ACRES
	X	1.5	FLOOR AREA RATIO (F.A.R.)
	=	8.06	ACRES (INCLUDES ALL FLOORS)
PROPOSED HOSPITAL SITE AREA CO-1-2		9.58	ACRES
	X	1.5	FLOOR AREA RATIO (F.A.R.)
	=	14.37	ACRES (INCLUDES ALL FLOORS)
PROPOSED HOSPITAL SITE AREA CO-1-2		3.62	ACRES
	X	1.5	FLOOR AREA RATIO (F.A.R.)
	=	5.43	ACRES (INCLUDES ALL FLOORS)

EQUIVALENT POPULATION CALCULATIONS

PROPOSED RESIDENTIAL EQUIVALENT POPULATION					
LABEL	SWR. TABLE 1-1 ZONE PER CITY ZONING	AREA (ACRES)	POP/NET ACRE	EQUIVALENT POPULATION	EQUIVALENT POPULATION (ROUNDED UP)
RES. AREA	RM-3-7	9.59	111.8	1071.9	1072
				SUBTOTAL POP.	1072

PROPOSED RESIDENTIAL EQUIVALENT POPULATION					
LABEL	SWR. TABLE 1-1 ZONE PER CITY ZONING	AREA (ACRES)	POP/NET ACRE	EQUIVALENT POPULATION	EQUIVALENT POPULATION (ROUNDED UP)
RES. AREA	RM-4-10	0.13	196.2	25.6	26
				SUBTOTAL POP.	26

PROPOSED RESIDENTIAL EQUIVALENT POPULATION					
LABEL	SWR. TABLE 1-1 ZONE PER CITY ZONING	AREA (ACRES)	POP/NET ACRE	EQUIVALENT POPULATION	EQUIVALENT POPULATION (ROUNDED UP)
COMM.	CO-1-2	8.06	43.7	352.2	353
				SUBTOTAL POP.	353

PROPOSED RESIDENTIAL EQUIVALENT POPULATION					
LABEL	ZONE PER CITY ZONING	AREA (ACRES)	POP/NET ACRE	EQUIVALENT POPULATION	POPULATION (ROUNDED UP)
HOSP. SPACE	HOSP.	14.37	150	2155.5	2156
				SUBTOTAL POP.	2156

PROPOSED RESIDENTIAL EQUIVALENT POPULATION					
LABEL	ZONE PER CITY ZONING	AREA (ACRES)	POP/NET ACRE	EQUIVALENT POPULATION	POPULATION (ROUNDED UP)
HOSP. SPACE	HOSP.	5.43	150	814.5	815
				SUBTOTAL POP.	815

TOTAL PROPOSED EQUIVALENT POPULATION	TOTAL POP.	4422

PROPOSED PEAK FLOW CALCULATIONS

NODE 5

AVERAGE FLOW

= TOTAL EQUIV. POP. X 80 GPD
= 4422 X 80 GPD
= 353760 GPD

PEAK FACTOR

= 6.2945 x (EQUIV. POP.) ^ (-0.1342)
= 2.04

PEAK FLOW

= PEAK FACTOR x AVERAGE FLOW
= 721670.4 GPD
= 1.12 CFS

APPENDIX B

Existing Condition Sewer Study Summary

Existing Condition Pipe Report

Existing Condition Manhole Report

APPENDIX B
SHARP HOSPITAL - EXISTING SEWER CONDITION
SEWER STUDY SUMMARY

LINE	FROM	TO	POPULATION PER D.U./NET ACRE	IN-LINE D.U.'S/ ACRES	POPULATION SERVED		PEAK/AVG. RATIO	PEAK DESIGN FLOW		LINE SIZE (IN)	DESIGN SLOPE (%)	dn (FT)	dn/D	VELOCITY fps	INFLOW INFILTRATION	COMMENTS
					IN-LINE	TOTAL		MGD	CFS							
P-06	MH-06	JC-07	150	7.65	1148	1148	2.45	0.23	0.35	12	0.21	0.31	0.31	1.65	-	*PRIVATE SEWER SEE APPENDIX A - EXISTING & PROPOSED SEWER FLOW CALCULATIONS FOR POPULATION COMPUTATIONS
P-07	JC-07	MH-08	-	-	-	1148	-	0.23	0.35	12	0.20	0.29	0.29	1.61	-	*PRIVATE SEWER NO ADDED FLOWS
P-08	MH-08	MH-09	-	-	-	1148	-	0.23	0.35	15	0.09	0.29	0.23	1.19	-	*PRIVATE SEWER NO ADDED FLOWS
P-09	MH-09	MH-242	-	-	-	1148	-	0.23	0.35	15	0.09	0.29	0.23	1.20	-	*PRIVATE SEWER NO ADDED FLOWS
P-10	MH-242	MH-243	-	-	-	1148	1.46	0.34	0.53	15	0.16	0.36	0.29	1.63	-	EXISTING PUMP STATION INFLOW PER *TEMPORARY PUMP STATION STUDY FOR THE WOMEN'S CENTER EXPANSION AND MEDICAL OFFICE BUILDING AT THE SHARP HOSPITAL SITE* DATED AUGUST 1996 BY JOHN POWELL & ASSOCIATES, INC. SEE APPENDIX A - SEWER FLOW CALCULATIONS
P-11	MH-243	MH-244	-	-	-	1148	-	0.34	0.53	15	0.09	0.38	0.3	1.33	-	NO ADDED FLOWS
P-12	MH-244	MH-245	-	-	-	1148	-	0.34	0.53	15	0.30	0.34	0.27	2.04	-	NO ADDED FLOWS
P-13	MH-245	MH-248	VARIES	17.78	3607	4755	2.1	0.94	1.46	15	6.9	0.4	0.32	8.76	-	INFLOW PER *PRELIMINARY MASTER SEWER STUDY INCLUDING CHILDRENS HOSPITAL COMPLEX, MEDICAL OFFICES AND RESIDENTIAL DEVELOPMENT IN THE SERRA MESA COMMUNITY, SAN DIEGO, CA (W.O. 426012)*, DATED AUGUST 10, 2006 BY PROJECT DESIGN CONSULTANTS

* SHADED AREA REPRESENTS PRIVATE SEWER SYSTEM
* NON-SHADED AREA REPRESENTS PUBLIC SEWER SYSTEM

Scenario: Base

Gravity Pipe Report

Label	Constructed Slope (ft/ft)	L (ft)	Material	Section Size	Total Flow (gpd)	Design Capacity (gpd)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	(d/D) (%)	Average Velocity (ft/s)	Mannings n
P-01	0.008000	15.00	PVC	8 inch	0.00	908,082.88	391.97	391.85	0.0	0.00	0.010
P-1A	0.011004	269.00	PVC	8 inch	0.00	1,065,001.47	394.95	391.99	0.0	0.00	0.010
P-02	0.010526	95.00	PVC	8 inch	0.00	1,041,642.50	391.79	390.79	0.0	0.00	0.010
P-03	0.010282	71.00	PVC	8 inch	0.00	1,029,467.75	390.73	390.00	0.0	0.00	0.010
P-04	0.009310	116.00	PVC	8 inch	0.00	979,632.93	389.94	388.86	0.0	0.00	0.010
P-05	0.041488	168.00	PVC	8 inch	0.00	2,067,960.51	388.76	382.10	23.6	0.00	0.010
P-06	0.002105	57.00	Concrete	12 inch	225,000.00	1,056,493.98	382.22	382.10	31.4	1.65	0.013
P-07	0.001957	46.00	Concrete	12 inch	225,000.00	1,018,488.59	382.10	381.96	28.7	1.61	0.013
P-08	0.000885	113.00	Concrete	15 inch	225,000.00	1,241,941.99	381.96	381.74	23.1	1.19	0.013
P-09	0.000901	111.00	Concrete	15 inch	225,000.00	1,253,080.71	381.68	381.46	23.0	1.20	0.013
P-10	0.001554	341.00	Concrete	15 inch	334,440.00	1,645,891.78	381.45	380.88	29.0	1.63	0.013
P-11	0.000893	112.00	Concrete	15 inch	334,440.00	1,247,474.05	380.88	380.68	29.5	1.33	0.013
P-12	0.002908	306.00	Concrete	15 inch	334,440.00	2,251,514.88	380.68	379.81	26.9	2.04	0.013
P-13	0.069286	14.00	Concrete	15 inch	1,056,111.00	0,989,106.48	379.81	378.61	31.7	8.76	0.013
P-14	0.054706	17.00	Concrete	15 inch	1,056,111.00	9,764,669.44	378.60	377.45	32.1	8.05	0.013
P-15	0.083182	22.00	PVC	8 inch	0.00	2,928,159.28	380.20	378.60	17.0	0.00	0.010

Scenario: Base

Gravity Node Report

Label	Rim Elevation (ft)	Sump Elevation (ft)	Total Flow (gpd)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Gravity Element Headloss (ft)	Velocity In (ft/s)	Velocity Out (ft/s)	Has Messages?	Has Flooding?
JC-07		381.79	225,000.00	382.10	382.10	0.00	1.64	1.64	false	false
MH-01	399.83	391.97	0.00	391.97	391.97	0.00	0.00	0.00	false	false
MH-1A	397.93	394.95	0.00	394.95	394.95	0.00	0.00	0.00	false	false
MH-02	399.73	391.79	0.00	391.79	391.79	0.00	0.00	0.00	false	false
MH-03	397.68	390.73	0.00	390.73	390.73	0.00	0.00	0.00	false	false
MH-04	398.39	389.94	0.00	389.94	389.94	0.00	0.00	0.00	false	false
MH-05	393.15	388.76	0.00	388.76	388.76	0.00	0.00	0.00	false	false
MH-06	385.74	381.91	225,000.00	382.22	382.22	0.00	1.65	1.65	false	false
MH-08	393.53	381.61	225,000.00	381.96	381.96	0.00	1.24	1.24	false	false
MH-09	399.18	381.33	225,000.00	381.68	381.68	0.00	1.25	1.25	false	false
MH-242	397.58	381.07	334,440.00	381.45	381.45	0.00	1.63	1.63	false	false
MH-243	403.79	380.46	334,440.00	380.88	380.88	0.00	1.42	1.42	false	false
MH-244	395.56	380.35	334,440.00	380.68	380.68	0.00	2.04	2.04	false	false
MH-245	394.10	379.30	,056,111.00	379.81	379.81	0.00	3.50	3.50	false	false
MH-246	394.26	380.20	0.00	380.20	380.20	0.00	0.00	0.00	false	false
MH-248	393.87	378.09	,056,111.00	378.60	378.60	0.00	3.50	3.50	false	false
O-1	393.87	377.16	,056,111.00	377.16	377.16	0.00	0.00	0.00	false	

Scenario: Base

Manhole Report

Label	Ground Elevation (ft)	Set Rim Equal to Ground Elevation?	Rim Elevation (ft)	Sump Elevation (ft)	Total Flow (gpd)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Gravity Element Headloss (ft)	Depth In (ft)	Depth Out (ft)	Velocity Out (ft/s)
MH-01	399.83	true	399.83	391.97	0.00	391.97	391.97	0.00	0.00	0.00	0.00
MH-1A	397.93	true	397.93	394.95	0.00	394.95	394.95	0.00	0.00	0.00	0.00
MH-02	399.73	true	399.73	391.79	0.00	391.79	391.79	0.00	0.00	0.00	0.00
MH-03	397.68	true	397.68	390.73	0.00	390.73	390.73	0.00	0.00	0.00	0.00
MH-04	398.39	true	398.39	389.94	0.00	389.94	389.94	0.00	0.00	0.00	0.00
MH-05	393.15	true	393.15	388.76	0.00	388.76	388.76	0.00	0.00	0.00	0.00
MH-06	385.74	true	385.74	381.91	225,000.00	382.22	382.22	0.00	0.31	0.31	1.65
MH-08	393.53	true	393.53	381.61	225,000.00	381.96	381.96	0.00	0.35	0.35	1.24
MH-09	399.18	true	399.18	381.33	225,000.00	381.68	381.68	0.00	0.35	0.35	1.25
MH-242	397.58	true	397.58	381.07	334,440.00	381.45	381.45	0.00	0.38	0.38	1.63
MH-243	403.79	true	403.79	380.46	334,440.00	380.88	380.88	0.00	0.42	0.42	1.42
MH-244	395.56	true	395.56	380.35	334,440.00	380.68	380.68	0.00	0.33	0.33	2.04
MH-245	394.10	true	394.10	379.30	,056,111.00	379.81	379.81	0.00	0.51	0.51	3.50
MH-246	394.26	true	394.26	380.20	0.00	380.20	380.20	0.00	0.00	0.00	0.00
MH-248	393.87	true	393.87	378.09	,056,111.00	378.60	378.60	0.00	0.51	0.51	3.50

APPENDIX C

Proposed Condition Sewer Study Summary

Proposed Condition Pipe Report

Proposed Condition Manhole Report

APPENDIX C
SHARP HOSPITAL - PROPOSED SEWER CONDITION
SEWER STUDY SUMMARY

LINE	FROM	TO	POPULATION PER D.U./NET ACRES	IN-LINE D.U.'S/ ACRES	POPULATION SERVED		PEAK/AVG. RATIO	PEAK DESIGN FLOW		LINE SIZE (IN)	DESIGN SLOPE (%)	dn (FT)	dn/D	VELOCITY fps	INFLOW INFILTRATION	COMMENTS
					IN-LINE	TOTAL		MGD	CFS							
P-1A	MH-1A	MH-01	150	2.43	365	365	2.85	0.08	0.13	8	1.1	0.2	0.29	2.81	-	*PRIVATE SEWER INFLOW SEE APPENDIX A - PROPOSED SEWER FLOW CALCULATIONS FOR POPULATION COMPUTATIONS
P-01	MH-01	MH-02	150	3.06	459	824	2.77	0.18	0.30	8	0.8	0.23	0.34	3.16	-	*PRIVATE SEWER INFLOW SEE APPENDIX A - PROPOSED SEWER FLOW CALCULATIONS FOR POPULATION COMPUTATIONS
P-02	MH-02	MH-03	-	-	-	824	-	0.18	0.30	8	1.05	0.22	0.328	3.49	-	*PRIVATE SEWER NO ADDED FLOWS
P-03	MH-03	MH-04	-	-	-	824	-	0.18	0.30	8	1.03	0.22	0.329	3.46	-	*PRIVATE SEWER NO ADDED FLOWS
P-04	MH-04	MH-05	-	-	-	824	-	0.18	0.30	8	0.93	0.22	0.333	3.34	-	*PRIVATE SEWER NO ADDED FLOWS
P-05	MH-05	JC-07	-	-	-	824	-	0.18	0.30	8	4.15	0.32	0.48	5.67	-	*PRIVATE SEWER NO ADDED FLOWS
P-06	MH-06	JC-07	150	7.65	1148	1148	2.45	0.23	0.35	12	0.21	0.39	0.39	1.65	-	*PRIVATE SEWER BRANCH LINE I.E. INFLOW SEE APPENDIX A - PROPOSED SEWER FLOW CALCULATIONS FOR POPULATION COMPUTATIONS
P-07	JC-07	MH-08	-	-	-	1972	-	0.41	0.65	12	0.196	0.4	0.4	1.9	-	*PRIVATE SEWER INFLOW FROM P-06 SEE APPENDIX A - PROPOSED SEWER FLOW CALCULATIONS FOR POPULATION COMPUTATIONS
P-08	MH-08	MH-09	-	-	-	1972	-	0.41	0.65	15	0.09	0.39	0.31	1.4	-	*PRIVATE SEWER NO ADDED FLOWS
P-09	MH-09	MH-242	-	-	-	1972	-	0.41	0.65	15	0.09	0.4	0.32	1.41	-	*PRIVATE SEWER NO ADDED FLOWS
P-10	MH-242	MH-243	-	-	-	1972	-	0.52	0.82	15	0.16	0.46	0.37	1.84	-	EXISTING PUMP STATION INFLOW PER *TEMPORARY PUMP STATION STUDY FOR THE WOMEN'S CENTER EXPANSION AND MEDICAL OFFICE BUILDING AT THE SHARP HOSPITAL SITE*, DATED AUGUST 1990 BY JOHN POWELL & ASSOCIATES, INC. SEE APPENDIX A - SEWER FLOW CALCULATIONS
P-11	MH-243	MH-244	-	-	-	1972	-	0.52	0.82	15	0.09	0.46	0.37	1.50	-	NO ADDED FLOWS
P-12	MH-244	MH-245	-	-	-	-	-	0.52	0.82	15	0.30	0.4	0.32	2.31	-	NO ADDED FLOWS
P-13	MH-245	MH-248	VARIES	17.78	4422	6394	2.04	1.24	1.94	15	6.90	0.44	0.35	9.18	-	INFLOW PER *PRELIMINARY MASTER SEWER STUDY INCLUDING CHILDRENS HOSPITAL COMPLEX, MEDICAL OFFICES AND RESIDENTIAL DEVELOPMENT IN THE SERRA MESA COMMUNITY, SAN DIEGO, CA (W.O 426012)*, DATED AUGUST 10, 2006 BY PROJECT DESIGN CONSULTANTS

* SHADED AREA REPRESENTS PRIVATE SEWER SYSTEM
* NON-SHADED AREA REPRESENTS PUBLIC SEWER SYSTEM

Scenario: Base

Gravity Pipe Report

Label	Constructed Slope (ft/ft)	L (ft)	Material	Section Size	Total Flow (gpd)	Design Capacity (gpd)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	(d/D) (%)	Average Velocity (ft/s)	Mannings n
P-01	0.008000	15.00	PVC	8 inch	184,935.00	908,082.88	392.22	392.06	34.0	3.16	0.010
P-1A	0.011004	269.00	PVC	8 inch	83,220.00	1,065,001.47	395.11	392.22	29.3	2.81	0.010
P-02	0.010526	95.00	PVC	8 inch	184,935.00	1,041,642.50	392.04	390.98	32.8	3.49	0.010
P-03	0.010282	71.00	PVC	8 inch	184,935.00	1,029,467.75	390.98	390.19	32.9	3.46	0.010
P-04	0.009310	116.00	PVC	8 inch	184,935.00	979,632.93	390.19	389.06	33.3	3.34	0.010
P-05	0.041488	168.00	PVC	8 inch	184,935.00	2,067,960.51	389.01	382.22	50.7	5.67	0.010
P-06	0.002105	57.00	Concrete	12 inch	225,000.00	1,056,493.98	382.26	382.22	39.0	1.65	0.013
P-07	0.001957	46.00	Concrete	12 inch	409,935.00	1,018,488.59	382.22	382.08	40.3	1.90	0.013
P-08	0.000885	113.00	Concrete	15 inch	409,935.00	1,241,941.99	382.08	381.82	31.1	1.40	0.013
P-09	0.000901	111.00	Concrete	15 inch	409,935.00	1,253,080.71	381.79	381.55	31.5	1.41	0.013
P-10	0.001554	341.00	Concrete	15 inch	519,375.00	1,645,891.78	381.55	380.98	37.0	1.84	0.013
P-11	0.000893	112.00	Concrete	15 inch	519,375.00	1,247,474.05	380.98	380.76	36.9	1.50	0.013
P-12	0.002908	306.00	Concrete	15 inch	519,375.00	2,251,514.88	380.76	379.85	32.0	2.31	0.013
P-13	0.069286	14.00	Concrete	15 inch	1,241,046.00	0,989,106.48	379.85	378.64	34.6	9.18	0.013
P-14	0.054706	17.00	Concrete	15 inch	1,241,046.00	9,764,669.44	378.64	377.46	34.3	10.17	0.013
P-15	0.083182	22.00	PVC	8 inch	0.00	2,928,159.28	380.20	378.64	20.4	0.00	0.010

Scenario: Base

Gravity Node Report

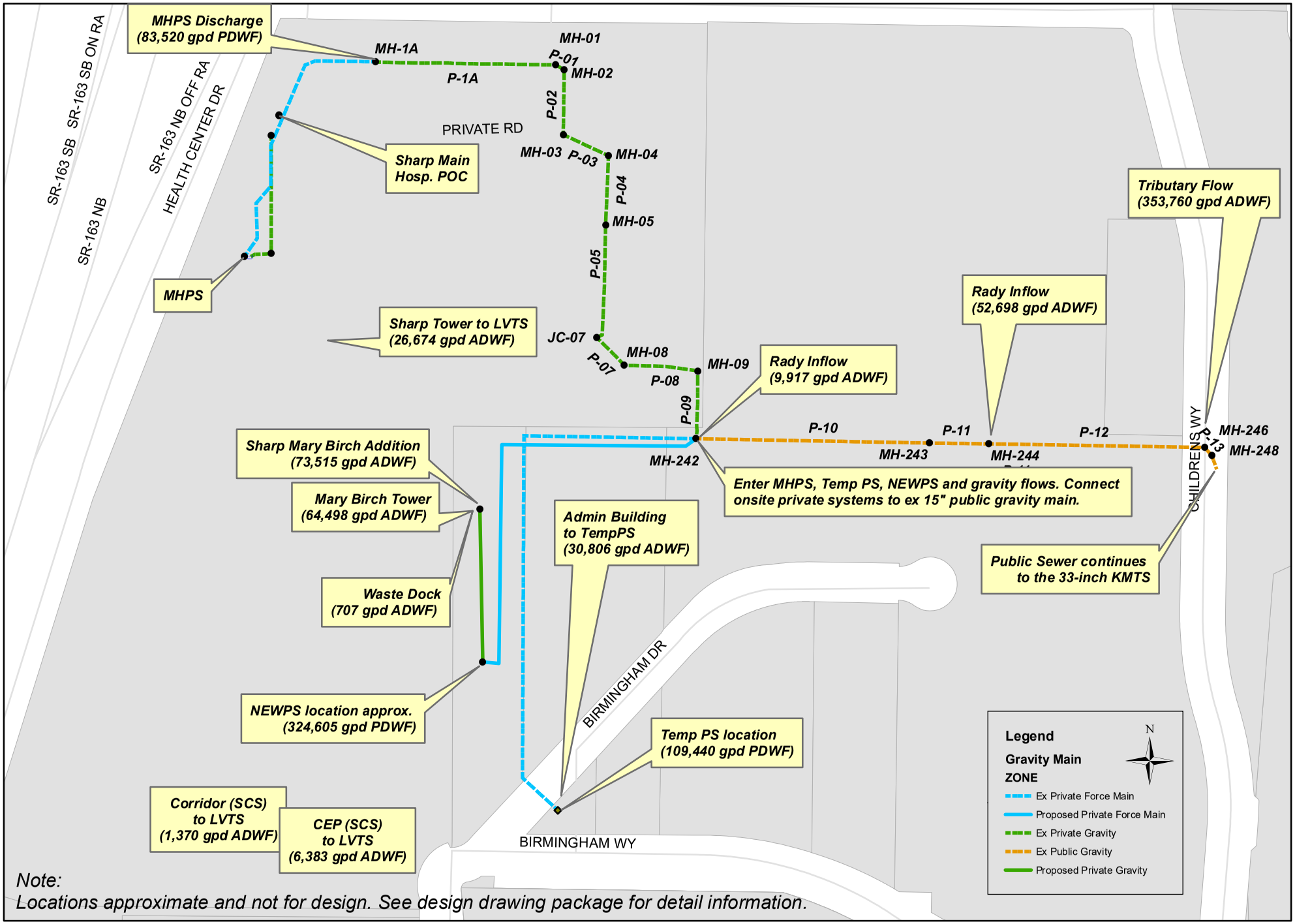
Label	Rim Elevation (ft)	Sump Elevation (ft)	Total Flow (gpd)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Gravity Element Headloss (ft)	Velocity In (ft/s)	Velocity Out (ft/s)	Has Messages?	Has Flooding?
JC-07		381.79	409,935.00	382.22	382.22	0.00	1.97	1.97	false	false
MH-01	399.83	391.97	184,935.00	392.22	392.22	0.00	2.43	2.43	false	false
MH-1A	397.93	394.95	83,220.00	395.11	395.11	0.00	1.93	1.93	false	false
MH-02	399.73	391.79	184,935.00	392.04	392.04	0.00	2.43	2.43	false	false
MH-03	397.68	390.73	184,935.00	390.98	390.98	0.00	2.43	2.43	false	false
MH-04	398.39	389.94	184,935.00	390.19	390.19	0.00	2.43	2.43	false	false
MH-05	393.15	388.76	184,935.00	389.01	389.01	0.00	2.43	2.43	false	false
MH-06	385.74	381.91	225,000.00	382.26	382.26	0.00	1.41	1.41	false	false
MH-08	393.53	381.61	409,935.00	382.08	382.08	0.00	1.52	1.52	false	false
MH-09	399.18	381.33	409,935.00	381.79	381.79	0.00	1.53	1.53	false	false
MH-242	397.58	381.07	519,375.00	381.55	381.55	0.00	1.84	1.84	false	false
MH-243	403.79	380.46	519,375.00	380.98	380.98	0.00	1.65	1.65	false	false
MH-244	395.56	380.35	519,375.00	380.76	380.76	0.00	2.31	2.31	false	false
MH-245	394.10	379.30	1,241,046.00	379.85	379.85	0.00	3.68	3.68	false	false
MH-246	394.26	380.20	0.00	380.20	380.20	0.00	0.00	0.00	false	false
MH-248	393.87	378.09	1,241,046.00	378.64	378.64	0.00	3.68	3.68	false	false
O-1	393.87	377.16	1,241,046.00	377.16	377.16	0.00	0.00	0.00	false	

Scenario: Base

Manhole Report

Label	Ground Elevation (ft)	Set Rim Equal to Ground Elevation?	Rim Elevation (ft)	Sump Elevation (ft)	Total Flow (gpd)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Gravity Element Headloss (ft)	Depth In (ft)	Depth Out (ft)	Velocity Out (ft/s)
MH-01	399.83	true	399.83	391.97	184,935.00	392.22	392.22	0.00	0.25	0.25	2.43
MH-1A	397.93	true	397.93	394.95	83,220.00	395.11	395.11	0.00	0.16	0.16	1.93
MH-02	399.73	true	399.73	391.79	184,935.00	392.04	392.04	0.00	0.25	0.25	2.43
MH-03	397.68	true	397.68	390.73	184,935.00	390.98	390.98	0.00	0.25	0.25	2.43
MH-04	398.39	true	398.39	389.94	184,935.00	390.19	390.19	0.00	0.25	0.25	2.43
MH-05	393.15	true	393.15	388.76	184,935.00	389.01	389.01	0.00	0.25	0.25	2.43
MH-06	385.74	true	385.74	381.91	225,000.00	382.26	382.26	0.00	0.35	0.35	1.41
MH-08	393.53	true	393.53	381.61	409,935.00	382.08	382.08	0.00	0.47	0.47	1.52
MH-09	399.18	true	399.18	381.33	409,935.00	381.79	381.79	0.00	0.46	0.46	1.53
MH-242	397.58	true	397.58	381.07	519,375.00	381.55	381.55	0.00	0.48	0.48	1.84
MH-243	403.79	true	403.79	380.46	519,375.00	380.98	380.98	0.00	0.52	0.52	1.65
MH-244	395.56	true	395.56	380.35	519,375.00	380.76	380.76	0.00	0.41	0.41	2.31
MH-245	394.10	true	394.10	379.30	,241,046.00	379.85	379.85	0.00	0.55	0.55	3.68
MH-246	394.26	true	394.26	380.20	0.00	380.20	380.20	0.00	0.00	0.00	0.00
MH-248	393.87	true	393.87	378.09	,241,046.00	378.64	378.64	0.00	0.55	0.55	3.68

APPENDIX B – MODEL RESULTS



Note:
Locations approximate and not for design. See design drawing package for detail information.

PIPE AND NODE MAP

Sharp Metropolitan Medical Campus (SMMC) Modernization & Improvement Project - Sewer Study for Conditional Use Permit

APPENDIX B - ANALYSIS RESULTS
TABLE B-1 EXISTING SEWER FLOWS

	Upstream MH			Downstream MH													
Pipe ID	ID	Rim	Inv	ID	Rim	Inv	Length	Diameter	In-line Pop.	Trib Avg Flow (gpd)[1]	Cumulative Average Flow (gpd)	Peaking Factor	Peak Dry Weather Flow (gpd)[2]	Peak Dry Weather Flow (cfs)	Slope (%)	Normal Depth (inches)	d/D	Velocity (fps)
P-06	MH-06	385.74	381.98	JC-07	383.24	**831.86**	57.0	12		91,840	91,840	2.46	225,926.4	0.35	0.26	3.56	0.30	1.8
P-07	JC-07	383.24	**381.35**	MH-08	393.53	**381.26**	46.0	12			166,832	2.29	465,265.3	0.72	0.20	5.65	0.47	2.0
P-1A	MH-1A	400.00	**393.18**	MH-1	399.50	**392.38**	269.0	8			0		83,220.0	0.13	1.10	1.73	0.22	2.3
P-01	MH-1	399.50	**392.04**	MH-2	399.69	**391.92**	15.0	8		65,920	65,920	2.75	264,500.0	0.41	0.80	3.41	0.43	2.9
P-02	MH-2	399.69	**391.92**	MH-03	397.53	**390.93**	95.0	8			65,920	2.75	264,500.0	0.41	1.05	3.17	0.40	3.2
P-03	MH-03	397.53	**390.73**	MH-04	397.86	**390.00**	71.0	8		9,072	74,992	2.60	278,199.2	0.43	1.03	3.26	0.41	3.2
P-04	MH-04	397.86	**389.80**	MH-05	393.15	**388.72**	116.0	8			74,992	2.60	278,199.2	0.43	0.93	3.36	0.42	3.1
P-05	MH-05	393.15	**393.15**	JC-07	383.24	**381.55**	168.0	12			74,992	2.60	278,199.2	0.43	4.15	2.26	0.19	5.3
P-08	MH-08	393.53	**381.06**	MH-09	399.18	**380.96**	113.0	15			166,832	2.29	465,265.3	0.72	0.09	6.32	0.42	1.5
P-09	MH-09	399.18	**380.76**	MH-242	397.58	**380.66**	111.0	15			166,832	2.29	465,265.3	0.72	0.09	6.32	0.42	1.5
P-10	MH-242	397.58	**380.46**	MH-243	403.79	**379.93**	341.0	15			166,832	2.29	574,705.3	0.89	0.16	6.07	0.40	1.9
P-11	MH-243	403.79	**379.73**	MH-244	395.56	**379.63**	112.0	15			166,832	2.29	574,705.3	0.89	0.09	7.13	0.48	1.5
P-12	MH-244	395.56	**379.43**	**MH-245**	**394.10**	**378.54**	306.0	15			166,832	2.29	574,705.3	0.89	0.29	5.17	0.34	2.4
P-13	**MH-245**	**394.10**	**378.34**	MH-248	393.87	**377.37**	14.0	15			166,832	2.29	574,705.3	0.89	6.93	2.33	0.16	7.3

1. Flow at this location includes sewage generation for a 0.25-ac commercial development.
2. Flow at this location includes sewage generation for a 1.5-ac commercial development.
3. Flow at this location includes sewage generation for a 2.5-ac non-residential development.
4. Flow at this location includes sewage generation for a 0.5-ac commercial development.
5. Flow at this location includes sewage generation for a 0.25-ac commercial development (gas station).
6. Flow at this location includes sewage generation for a 0.1-ac commercial development (real estate building).
7. Flow at this location includes sewage generation for 2 existing single family homes and the 24-unit trailer park.

APPENDIX B - ANALYSIS RESULTS
TABLE B-2 PROPOSED FLOWS

	Upstream MH			Downstream MH														
Pipe ID	ID	Rim	Inv	ID	Rim	Inv	Length	Diameter	Trib Avg Flow (gpd)[1]	Cumulative Average Flow (gpd)	In-line Pop.	Peaking Factor	Peak Dry Weather Flow (gpd)[2]	Peak Dry Weather Flow (cfs)	Slope (%)	Normal Depth (inches)	d/D	Velocity (fps)
P-06	MH-06	385.74	381.98	JC-07	383.24	**831.86**	57.0	12		0		2.46	0.0	0.00	0.26	0.00	0.00	0.0
P-07	JC-07	383.24	**381.35**	MH-08	393.53	**381.26**	46.0	12		7,409	93	2.29	100,186.6	0.16	0.20	1.75	0.15	1.2
P-1A	MH-1A	400.00	**393.18**	MH-01	399.50	**392.38**	269.0	8		0	0	0.00	83,220.0	0.13	1.10	1.52	0.19	2.2
P-01	MH-01	399.50	**392.04**	MH-02	399.69	**391.92**	15.0	8		0	0	0.00	83,220.0	0.13	0.80	1.87	0.23	2.1
P-02	MH-02	399.69	**391.92**	MH-03	397.53	**390.93**	95.0	8		0	0	0.00	83,220.0	0.13	1.05	1.74	0.22	2.3
P-03	MH-03	397.53	**390.73**	MH-04	397.86	**390.00**	71.0	8	7,409	7,409	93	4.00	112,856.0	0.17	1.03	2.00	0.25	2.5
P-04	MH-04	397.86	**389.80**	MH-05	393.15	**388.72**	116.0	8		7,409	93	4.00	112,856.0	0.17	0.93	2.06	0.26	2.4
P-05	MH-05	393.15	**393.15**	JC-07	383.24	**381.55**	168.0	12		7,409	93	4.00	112,856.0	0.17	4.15	1.26	0.11	3.8
P-08	MH-08	393.53	**381.06**	MH-09	399.18	**380.96**	113.0	15	1,664	9,073	113	4.00	119,512.0	0.18	0.09	3.08	0.21	1.0
P-09	MH-09	399.18	**380.76**	MH-242	397.58	**380.66**	111.0	15		9,073	113	4.00	119,512.0	0.18	0.09	3.08	0.21	1.0
P-10	MH-242	397.58	**380.46**	MH-243	403.79	**379.93**	341.0	15	9,917	18,990	237	3.90	587,841.0	0.91	0.16	6.14	0.41	1.9
P-11	MH-243	403.79	**379.73**	MH-244	395.56	**379.63**	112.0	15		18,990	237	3.90	587,841.0	0.91	0.09	7.22	0.48	1.6
P-12	MH-244	395.56	**379.43**	**MH-245**	**394.10**	**378.54**	306.0	15	52,698	71,688	896	2.60	700,168.8	1.08	0.29	5.74	0.38	2.5
P-13	**MH-245**	**394.10**	**378.34**	MH-248	393.87	**377.37**	14.0	15	353,760	425,448	5,318	1.98	1,356,167.0	2.10	6.93	3.55	0.24	9.4

1. Flow at this location includes sewage generation for a 0.25-ac commercial development.
2. Flow at this location includes sewage generation for a 1.5-ac commercial development.
3. Flow at this location includes sewage generation for a 2.5-ac non-residential development.
4. Flow at this location includes sewage generation for a 0.5-ac commercial development.
5. Flow at this location includes sewage generation for a 0.25-ac commercial development (gas station).
6. Flow at this location includes sewage generation for a 0.1-ac commercial development (real estate building).
7. Flow at this location includes sewage generation for 2 existing single family homes and the 24-unit trailer park.