Low Pressure (STEP) Sewer System Design Report
For
Amazing Facts Ministry
with
Annexation to Placer County SMD #2

~~June 11, 2009~~
Updated April 4, 2011

Prepared By:

KING
ENGINEERING
INC.
PLANNING
ENGINEERING
CONSTRUCTION SUPPORT

563 Brunswick Road, Suite 11 Grass Valley, CA 95945
Phone (530) 272-8328 Fax (530) 272-6039

TABLE OF CONTENTS

	Page
1.0 PURPOSE AND PROPOSAL	1
2.0 PROJECT DESCRIPTION	3
3.0 DESIGN CRITERIA	3
4.0 DETERMINATION OF PROJECT'S ADWF	5
5.0 PLACER UGA ULTIMATE BUILDOUT CONCEPT	7
6.0 PEAK FLOW DERIVATION FOR PROJECT	7
7.0 MASTER STEP SEWER PLAN	10
8.0 IMPACTS AND MITIGATIONS	12
9.0 REFERENCES	17

TABLES:

TABLE 1 – DESIGN CRITERIA REFERENCES (SECT. 1.0)	2
TABLE 2 – CITY OF ROSEVILLE SEWER UNIT FACTORS (SECT. 3.01)	3
TABLE 3 – ESTIMATED UNIT SEWER FLOWS (SECT. 3.02)	3
TABLE 4 – PEAK FLOW DERIVATION METHODS – STEP SYSTEMS (SECT. 3.05)	4
TABLE 5 – PROJECT ADWF BASED ON LAND USE (SECT. 4.01)	5
TABLE 6 – PROJECT EDU'S BASED ON BUILDING USE DATA (SECT. 4.02)	6
TABLE 7 – PROJECT ADWF BASED ON EDU'S (SECT. 4.03)	7
TABLE 8 – PROJECT INSTANTANEOUS PEAK SEWER FLOW (SECT. 6.01)	8
TABLE 9 - PROJECT DESIGN PEAK SEWER FLOW AND VOLUME (SECT. 6.02)	9
TABLE 10–IMPACTS TO EXISTING STEP SYSTEM HYDRAULICS (SECT. 8.02)	15

HYDRAULIC CALCULATIONS:

EXHIBIT 1 – EXIST STEP SYSTEM HYDRAULIC MODEL (SCHEMATIC LAYOUT)	19
HYDRAULIC SUMMARY TABLES H1-H2	20
EXHIBIT 2 – EXIST + PROJECT (PHASE I) STEP HYDRAULIC MODEL	21
HYDRAULIC SUMMARY TABLES H3-H5	22
EXHIBIT 3 – EXIST + PROJECT (ALL PHASES) STEP HYDRAULIC MODEL	25
HYDRAULIC SUMMARY TABLES H6-H9	26
EXHIBIT 4 – EXIST + PROJECT (ALL PHASES) + ULTIMATE MODEL	29
HYDRAULIC SUMMARY TABLES H9-H11	30

FIGURES:

FIGURE 1-PROJECT (PHASE I) PEAK SEWER FLOW DESIGN SCENARIO	(GRAPH)
FIGURE 2-PROJECT (ALL PHASES) PEAK SEWER FLOW DESIGN SCENARIO	(GRAPH)
FIGURE 3- PROJECT SEWER PUMP STATION PROFILE AND DETAILS	
FIGURE 4- HYDRAULIC GRADE LINE (HGL) PROFILE – EXIST. STEP SYSTEM (31 EDU)	
FIGURE 5- HGL PROFILE – EXIST. + PROJECT (PHASE I)	
FIGURE 6- HGL PROFILE – EXIST. + PROJECT (ALL PHASES)	
FIGURE 7- HGL PROFILE– EXIST. + PROJECT (ALL PHASES) + ULTIMATE (36 EDU)	

APPENDIX:

EXAMPLES OF PEAK DESIGN FLOW DERIVATIONS FOR STEP SEWER SYSTEMS
PUMP CURVES FOR PROJECT PUMP STATION
LETTER FROM SPMUD – AVAILABLE CAPACITY IN SEWER

MAPS:

MAP 1- SMD 2 SERVICE AREA MAP FOR PROPOSED ANNEXATION AND CONCEPT SEWER SERVICE PLAN FOR PLACER UGA	(folded)
PRELIMINARY UTILITY PLAN	(folded)

1.0 PURPOSE AND PROPOSAL

Amazing Facts, Inc. proposes to locate a church and publishing facility on a 75.5 acre site on Sierra College Boulevard in Placer County, California. This project is proposed to be built in two phases. This report analyzes the hydraulics, presents the impacts and proposes mitigation measures required to connect this project in two phases to public sanitary sewer. This project would be required to annex to the Placer County Sewer Maintenance District #2 (SMD 2) and connect to the South Placer Municipal Utility District public sewer collection system.

Wastewater treatment is provided by the City of Roseville pursuant to the South Placer Wastewater Authority (SPWA) Operations Agreement for properties within the SPWA Service Area Boundary (SAB). SMD 2 also has a treatment contract with the City of Roseville. This site is not within the SPWA SAB, but is within the Placer Urban Growth Area (UGA) adjacent to the SAB. This UGA is surrounded by the SPWA SAB and is shown adjacent to the SMD 2 boundary on enclosed Map 1. The SPWA Wastewater Systems Evaluation Project treats the 630 acres in the Placer UGA as a point source in its hydraulic sewer model (ref. 5, Appendix S, TM9a). That sewer model is based on the SPWA 2005 proposed SAB combined with ten UGA's. That report did not predict the Placer UGA to be completely sewered at build out due to steep topography and low development density (ref. 5, Appendix A, TM1b, Table 4). Even so, that report prudently assigned a flow for the Placer UGA based on an average dry weather flow (ADWF) of 10,000 gpd (ref.5, App. A, TM 1b, App. G, TM 3a, App. D, TM 2b). This report shows that this project will produce less than 10,000 gpd ADWF and fits within the Evaluation Project sewer model. An approval action for the modification of the SAB will be required by the SPWA after this project's environmental document is certified pursuant to CEQA.

This project proposes to connect to the existing STEP (septic tank effluent pumped) pressure sewer system in Cavitt Ranch Subdivision 900 feet to the southwest. That existing STEP system connects to the South Placer Municipal Utility District (SPMUD) gravity sewer manhole number RKLN 01 at Scarborough Drive. The church proposes to install an on site septic tank with pump tank and triplex alternating submersible, screened high head effluent pumps. SPMUD has stated in a letter, copied in the Appendix, that there is adequate collection sewer system capacity for this project. This report analyzes the hydraulic capacity of the existing STEP system for this project. This report also analyzes any residual capacity in the STEP system for other property within the Placer UGA that could feasibly connect.

This report lists design criteria in Section 3. Section 3 also refers to referenced criteria listed in the Appendix. In Section 4, this report uses the criteria listed in Section 3 and the proposed land use and building use data to determine the project's ADWF. The project's ADWF is then derived in two ways as shown in Tables 5 and 7. In Section 6, this report uses criteria from Section 3 and the proposed building use data to derive the peak design flow to size the project's sewer pumps and on site pump storage tank. Section 7 describes the master sewer plan and hydraulic calculation results. Section 8 lists sewer impacts and proposed mitigations for this project. In the Calculations Section, this report shows a schematic hydraulic model for each condition calculated and the hydraulic results are listed in the tables following the schematic models. Exhibit 1 shows the existing STEP system (31 EDU) alone. Exhibit 2 shows the existing (31 EDU) + Project (Phase I). Exhibit 3 shows the existing (31 EDU) + Project (All Phases). Exhibit 4 shows the existing (31 EDU) + Project (All Phases) + ultimate (36 EDU). Hydraulic grade profiles are shown in Figures 4 through 7 for each of these four flow conditions. The Appendix lists examples of peak design flow derivations for residential STEP services and shows the selected project sewer pump curve. Map #1

shows the proposed annexation to SMD 2. It shows the present SMD 2 boundary, the project site, the Placer UGA and the residual capacity for ultimate service for future development in the UGA. Table 1 below conveniently lists the references used to derive the ADWF and peak design flows. References are listed in Section 9.

TABLE 1
DESIGN CRITERIA REFERENCES

Category of Study	Reference and Reason for its Use
1. Determine if this project's projected average daily sewer flow fits within the 10,000 gpd ADWF assigned by SPWA for the Placer UGA.	1. Reference 4 (City of Roseville Code) is used to determine sewer units SU's for this project. This derivation is shown in Section 4, Table 6. SU's are calculated by multiplying the area of each use by the unit SU per 1000 square feet. Roseville SU's are equivalent to SPWA DU's for this study purpose. One residence is assigned 1 SU or 1 DU. 2. Ref. 5 (Appendix G, TM 3a, Table 1) is used as one way to compute the project's ADWF by land use or occupancy. The ADWF is calculated by multiplying the flow factor for each type of occupancy by the area of use. Table 5 in Section 4 shows this derivation. 3. Ref. 5 (Appendix G, TM 3a) is used as another way to compute the project's ADWF by converting the calculated project DU's to ADWF using the unit factor of 190 gpd per DU. Table 7 in Section 4 shows this derivation.
2. Determine the design peak flow for the offsite STEP residential services. The design flow is used to size infrastructure.	Table 4 in Section 3 presents different methods for calculating design peak flow for a STEP system. The method presented by e/One is the method selected, but is adapted for centrifugal service pumps.
3. Determine this project's peak sewer flow and volume to size the church sewer pumps and pump tank. This is a wet weather peak flow. Figures 1 and 2 show plausible scenarios of pumping and sewage storage during the design maximum use period for Phase I and All Phases.	1. Ref. 6 (Uniform Plumbing Code) and Ref. 2 (Metcalf & Eddy) to determine peak flow by fixture unit or use. Tables 8 and 9 in Section 6 show these derivations. The required peak pump flow is a function of the peak flows and storage provided over the design maximum 4 hour use period. See Figure 1.
	2. Ref. 3 Orenco Systems pump curves are used to model this project's pumping capacity. The Appendix shows the selected pump curve.
4. Model the STEP sewer hydraulics with peak residential and project flows. There are four flow conditions considered as described above and shown in Exhibits 1 through 4. These schematic pipe models are shown in the Calculations Section and the following Tables summarize the hydraulic information.	1. The hydraulics are performed by the Haestad waterCAD program, using Hardy Cross analysis and Hazen Williams formula, with a pipe roughness C factor of 120. The different hydraulic scenarios are listed in the calculations. Figures 4 through 7 show the design hydraulic profiles in the existing and proposed STEP system.

2.0 PROJECT DESCRIPTION

The project will consist of three buildings built in two phases. These buildings will be used for multi-use/publishing, a resource center/publishing warehouse and church school/sanctuary. The size of these buildings will total 197,030 square feet. Table 6 in Section 4 lists the sizes of and uses for each building for each phase of construction.

3.0 DESIGN CRITERIA

3.01 TABEL 2

CITY OF ROSEVILLE SEWER UNIT FACTORS

(THESE NUMBERS ARE USED IN SECTION 4 TO DETERMINE PROJECT'S ADWF)

(Ref. 4)

Type of Occupancy	Sewer Unit (SU) Factor
Residence	1 SU per residence (This is equivalent to 1 SPWA DU per residence)
Church - without kitchen	1/6 SU per 1000 s.f.
Office	1/3 SU per 1000 s.f.
Warehouse	1 SU per 5 employees
Multi-Use area with kitchen (maximum possible sewer use for this area is treated as a café or restaurant factor)	2 SU per 1000 s.f.

3.02 TABLE 3

ESTIMATED UNIT SEWAGE FLOWS

(THESE NUMBERS ARE USED IN SECTION 6 TO DETERMINE PROJECT'S PEAK SEWER FLOW)

Type of Occupancy	Assigned unit flow gallons	Reference
Office - per employee	15 per employee (includes visitors)	Ref. 2 (Metcalf & Eddy)
Warehouse – per employee	15 per employee (treat as office)	Ref. 2 (Metcalf & Eddy)
Church - per seat with kitchen waste	7 per seat or occupant for multiple seatings	Ref. 6 (CPC)
Sanctuary or Chapel or special event - per seat without kitchen waste	5 per seat or occupant	Ref. 6 (CPC)

3.04 DESIGN FLOW DERIVATION USED FOR SIZING STEP SYSTEM PIPELINES

There are several methods or equations from which to determine the peak flow design for a pumped STEP system. Three of these methods are presented in Table 4 below and compared to the existing Cavitt Ranch design. The Appendix shows additional information on these three methods.

3.05 TABLE 4

PEAK FLOW DERIVATION METHODS – STEP SYSTEMS

(COMPARISON OF METHODS SHOWN FOR CAVITT RANCH STEP SYSTEM)

Derivation Method	No. of EDU'S	Derivation of Peak Flow	Peak Flow gpm	Remarks
Cavitt Ranch Design	31	Unconventional method (Note 1)	120	Unconventional method with unreliable results (Note 1)
Environment/One	31	6(10+20)/2 (Note 2 and Appendix)	90	This is the selected method for this report. It is adapted for centrifugal service pumps.
Battelle Institute	31	Per Graph for DU (Note 3 and Appendix)	42	Reasonable flow, but higher flow is selected for project to avoid under sizing pipes
Terry Bounds	31	31(380x3.6)/1440 + 20 (Note 4 and Appendix)	50	Reasonable flow, but higher flow is selected for project to avoid under sizing pipes

Notes:

1. The Cavitt Ranch design used an unconventional method. It assumed 2/3 of the pumps are on at one time, discharging 10 gpm per pump. In an unconventional way, it did not correctly accumulate flows from branches. Because of this method, it derived some hydraulic grade lines that decreased as the analysis proceeded upstream. It derived gravity flow in pipes that should have been pressure flow. This report considers the existing hydraulic design results to be unreliable.
2. Environment/One uses a simple chart that lists the probable number of service sewer pumps on at one time. This was derived from a study done in Albany and is listed in the Appendix. Although this was derived for positive displacement pumps with small on site storage tanks, it can reasonably be adapted to STEP centrifugal pumps with large on site storage. If anything, this method should result in slightly over sizing the peak design flow. Since minimum velocities for septic effluent is not so critical, it should be better to slightly oversize as compared to undersize. Low head centrifugal pumps are assumed to discharge 20 gpm. High head centrifugal pumps are assumed to discharge 10 gpm. When both types of pumps could be on simultaneously, 15 gpm is the assumed average discharge per pump. Note that for 31 services, 6 pumps are presumed to be pumping simultaneously. This method is used for this project because it is easy to use and does not undersize the design flows.
3. Battelle Institute presents the results of their flow studies in a graph that is included in the Appendix. For a small number of pumps, this may derive slightly low design flows.
4. Terry Bounds provides a linear equation to determine peak flow. There is a base pump flow included in the equation so that small branch flows are not undersized. This equation is listed in the Appendix. Into this equation, we have inserted an average daily flow of 380 gpd/EDU with a peaking factor of 3.6. This is consistent with the criteria in TM 3a. We have used a base pump flow, D = 20 gpm. We have used this equation in previous designs and believe it gives reasonable design flows, but we have selected the method described in Note 2 to be sure we have not undersized the project pump station.
5. Other derivations not listed herein generally provide design flows that are too small for this number of services.

Since effluent in STEP lines is solids free, the minimum velocity at design flow should be allowed to be low, with 2 fps being a preferred minimum. The minimum STEP sewer line size shall be 2" diameter. The design velocity may typically be less than 2 fps in the 2" lines. Ref. 5, TM 3a allows

a maximum velocity of 10 fps in force mains. We have kept design velocities below 8 fps in the STEP mains.

3.06 PROJECT SEWER PUMP SYSTEM CRITERIA

The proposed sewer pump system shall comply with the planning level criteria listed in Ref. 5, TM 3a, Attachment B. This project's sewer pumps shall be sized for peak wet weather flow and shall be high head, screened effluent pumps, designed to pump septic tank effluent. Two sewer pumps shall alternate with a lead/lag float control operation. A redundant third pump shall be on standby. The pump tank shall have up to 24 hours of storage capacity with no back up generator. Residential STEP service pumps should be able to simultaneously deliver at least 6 gpm during this project's design flow conditions.

4.0 DETERMINATION OF PROJECT'S ADWF

We present two methods for deriving the project's ADWF. Table 5 shows a derivation based on land use and flow factors listed in Ref. 5, TM 3a, Attachment B. Table 5 uses a project size of 75 acres for Amazing Facts. It also prorates the land use based on building sizes and frequency of use per week to derive an ADWF.

4.01 TABLE 5
PROJECT ADWF BASED ON LAND USE
(SEE TABLE 7 DERIVATION OF ADWF BASED ON BUILDING USE DERIVED EDU'S)

LAND USE	% OF PROJECT SIZE	FREQUENCY OF USE	FLOW FACTOR (Ref. 5)	DERIVATION OF ADWF
Commercial (96,000 s.f. of publishing use)	11.1%	4 out of 7 days per week	850 gpd/acre	11.1% x 75 x 4/7 x 850 = 4043 gpd
Light Industrial (11,220 s.f. of warehouse use)	1.3%	4 out of 7 days per week	850 gpd/acre	1.3% x 75 x 4/7 x 850 = 474 gpd
Church (89,810 s.f. of church use)	11.6%	3 out of7 days per week	660 gpd/acre	11.6% x 75 x 3/7 x 660 = 2461 gpd
Open Space (56 acres)	76%		0 gpd/acre	
TOTALS	**100%**			**6,978 gpd**

4.02 **TABLE 6**

PROJECT EDU'S BASED ON BUILDING USE DATA

(AND CITY OF ROSEVILLE SEWER UNIT FACTORS – REF. 4)

Project Phase	**Building**	**Building Uses**	**Size of Use** s.f.	**Unit SU Factor** (From Table 2, Section 3)	**Day of Week for Use**	**Estimated Sewer Units (SU)**	
						Mon-Th SU's	Saturday SU's
I	Publishing/ Multi-Use 96,000 s.f.	1. Publishing offices & work area	38,560	.33/1000	M-Th	12.9	
		2. Church Office	4,980	.33/1000	M-Th	1.7	
		3. Chapel – 90 seats	1,960	.17/1000	3 days mid week	0.3	
		4. Non-simultaneous multi use – 324 table seating or 624 assembly seating or sports floor area (includes kitchen area)	7,900	.17/1000	Sat or special event mid week	1.3	15.8
		5. Classrooms, stage, reception and remainder of building	42,600	.17/1000	Sat		7.1
	Resource Center	Warehouse for books/multi-media – 6 employees	11,220	1/5 empl.	M-Th	1.2	
II	Sanctuary	Church and classrooms	89,810	.17/1000	Sat -9 am to 1 pm		15
TOTAL PROJECT – All Phases			197,030			18	38

NOTES:

1. SU's are calculated as shown and are equal to SPWA DU's and Placer County's EDU's.
2. The maximum expected sewer units are shown by the day of the week they are generated.
3. There is no occupancy or building use proposed for Friday or Sunday.
4. The average ultimate number of DU's over the week is derived as follows:
   Phase I: (18 Du x 4 + 23 DU)/7 days = 14 DU's
   Phase I and II: (18 Du x 4 + 38 DU)/7 days = 16 DU's

4.03 TABLE 7
PROJECT ADWF BASED ON EDU'S
(COMPARE TO TABLE 5 DERIVATION OF ADWF BASED ON LAND USE)

Project Phase	Average DU'S From Table 6 above (Note 1)	Unit ADWF per DU (ref. 5, App. G, TM 3a)	Total ADWF
I	14	190 gpd/DU	2,660 gpd
II	2	190 gpd/DU	380 gpd
Phase I +II Total Project	16		**3,040 gpd**

NOTES:

1. The average DU's from Table 6 are used since the derived total ADWF will be compared to the SPWA ADWF, which is an average daily flow.

The derivations presented in Tables 5 and 7 predict a project ADWF between 3,040 and 6,978 gpd. This project's ADWF fits within the SPWA model for the Placer UGA ADWF of 10,000 gpd. The remaining modeled ADWF, between 3,022 gpd and 6,960 gpd is reserved for up to 36 future DU's. The flow from these potential DU's will be accommodated in the STEP system sizing and reserved for the rest of the Placer UGA as discussed below.

5.0 PLACER UGA ULTIMATE BUILD OUT CONCEPT

Map 1 also shows the concept sewer service plan for the Placer UGA. The maximum STEP system service pumping head that will produce at least 6 gpm is about 315 feet. This fact limits the area in the Placer UGA that can connect to the existing STEP system to this project and about 240 acres of undeveloped property to the east of this project. This is shown as future STEP Service Area "A" on Map 1. The remaining 36 DU's are assigned to these 240 acres. The Preliminary Utility Plan and hydraulic calculations take into account these future DU's in the infrastructure sizing.

The remaining 310 acres of the Placer UGA are already subdivided or developed. It is probable that public sewer would be extended to these lots only if there were failing septic systems. These lots are too low in elevation or too far away to be efficiently served by the proposed STEP system. These lots would most likely be served as shown by a gravity sewer extension along Cavitt Stallman Road.

6.0 PEAK FLOW DERIVATION FOR PROJECT

This report derives the project peak flow by assigning a design sewer volume during a four hour maximum use period, proposed to occur on Saturday. Table 8 shows the instantaneous peak flow based on plumbing fixture units. Table 9 shows the maximum estimated sewer volume produced during the maximum use period on Saturday between 9 am and 1 pm based on occupancy. Peak flows derived in Tables 8 and 9 are plotted in a plausible scenarios for each phase of the project during the maximum use period in graph format in Figures 1 and 2. These two figures shows how the proposed church pumps and storage volume will accommodate the fluctuations in sewer flow during the maximum use period. The church pumps are designed to be pumping simultaneous to the STEP system residential pumps that will ultimate number 67 (67 ultimate EDU's).

6.01 TABLE 8

PROJECT INSTANTANEOUS PEAK SEWER FLOW
FROM FIXTURES USED ON PEAK USE DAY (SATURDAY)
(PLUMBING FIXTURE UNIT METHOD)

OCCUPANCY And PLUMBING FIXTURES	**PLUMBING SEWER FIXTURE UNITS (F.U.) PER FIXTURE**	**TOTAL F.U.**	**INSTANTANEOUS PEAK FLOW gpm** (Ref. 6, App. A, Chart A-2)
Phase I – Church, Sanctuary, Classrooms, kitchen and Multi-Use			
25 WC flushometer valves	115+200	315	
9 Urinals	58+20	78	
44 Lavatories	1	44	
2 showers	2	4	
Kitchen			
1 kitchen sink	1.5	1.5	
2 food prep sinks	1.5	3	
1 dishwasher	1.5	1.5	
Misc. appliances		2	
Phase I Total (Peak flow figured at 95% of instantaneous water demand)		449	128 gpm
All Phases – Church, Sanctuary, Classrooms, kitchen and Multi-Use			
36 WC flushometer valves	115 + 310	425	
10 Urinals	58+25	83	
44 Lavatories	1	44	
2 showers	2	4	
kitchen		8	
All Phases Total (Peak flow figured at 95% of instantaneous water demand)		564	145 gpm

NOTES: This result is used to plot plausible flow rates in Figure 1. A peak sewer flow of 95% of the peak water demand is used to account for some consumption and flow attenuation.

6.02 **TABLE 9**

PROJECT DESIGN PEAK SEWER FLOW AND VOLUME

Type of Occupancy	**Building Size** square feet	**Time of Occupancy**	**Occupants**	**Unit wastewater produced** gallons/occupant (Ref. 2 and 6)	**Total wastewater volume Phase I** gallons	**Total wastewater volume All Phases** gallons
Church:						
Phase I Classrooms, Multi-Use & Support	54,350 s.f.	9AM to 1PM Saturday	1,300 occupants	7	9,100	9,100
Phase II Sanctuary	89,810 s.f.		2,000 occupants	7	-	14,000
On site infiltration & Misc.					100	100
Total design sewage volume produced in 4 hour period					9,200	23,200
Average flow rate over 4 hour period (gpm)					9,200/240 = 38 gpm	23,200/240 = 97 gpm
Proposed Pump Rates are conservatively shown in Figure 2 to vary between 60 and 80 gpm for the ultimate flow conditions. (The hydraulic model predicts actual pump flow rates between 65 and 91 gpm)						

NOTES:

1. The proposed pump system complies with the criteria listed in Section 3.
2. This sizing is based on the Project's All Phase maximum use, with a meal, by 3,300 occupants occurring over a 4 hour period.
3. Total Storage volume provided in pump tank above all pumps-off level = 23,400 gallons. This volume will contain the maximum design sewer volume from Friday through Sunday (23,200 gallons) with all pumps off.
4. Figures 1 and 2 show how this design pump tank volume of 23,200 gallons is used over this maximum use period. A triplex pump system is proposed. Up to two pumps will run simultaneously while the third pump is on stand by. Each pump will have its own pump event counter and hour meter, so operators can check for proper pump operation and proper alternation sequencing.
5. Figures 1 and 2 show plausible pumping scenarios for this maximum use period. There is additional safety factor in that the church pumps will likely pump at higher flow rates, since the residential pumps will not actually maintain a peak flow rate over this entire four to five hour period.
6. Figure 3 shows the storage volumes in the pump tank between each float level. These volumes are 1170 gallons between all pumps off and lead pump on and 2340 gallons between lag pump on and lead pump on and 8000 gallons between high water alarm and lag pump on. There is also 11,600 gallons of reserve volume above high water alarm.

7.0 MASTER STEP SEWER PLAN

Map 1 shows the overall service area boundary proposed for the annexation of this project to SMD 2. Map 1 also shows the Placer UGA concept sewer service plan. Map 1 also shows the existing Cavitt Ranch STEP system and the 31 residential EDU's that it serves. Map 1 also shows the STEP system extension required for this project and a potential future STEP system extension for up to 36 future residential EDU's in the Placer UGA. The attached Preliminary Utility Plan shows the proposed on site sewer plan with connections to the existing STEP system for each Project Phase. The attached calculations provide the basis for the proposed on site and STEP system for this project.

Description of on site master sewer plan components:

This project is proposed to be built in two phases. Placer County ESD is requiring that the on site sewer system be sized and built for the ultimate occupancy in the first phase of construction. As shown in the attached Preliminary Utility Plan, the on site sewer system will consist of the following:

1. Gravity flow sewer collection lines from each building to a common septic tank
2. Grease interceptor tank for the kitchen in the Multi-Use Building
3. Septic tank is sized to remove solids so that the sewer effluent pumps are pumping solids-free effluent to the STEP system. The septic tank effluent flows to the pump vaults with attached pump storage tank.
4. Pump station consists of pump vault and pump storage tank with triplex, high head screened effluent pump system, control panel, float controls and alarms. The pump storage tank has reserve capacity for up to three days of project sewer flow to account for power outages. Design shall include pump counters and pump hour meters so that sewer flow can be estimated by maintenance personnel. As built plans and an operation and maintenance manual will be provided.

The master STEP sewer plan is hydraulically analyzed using schematic pipe layouts. Four different pumping scenarios and their effects to the existing system are shown in the Calculations Section of this report as follows:

Existing System: Exhibit 1 shows a schematic pipe layout for the existing STEP system in Cavitt Ranch, using the design flows derived by Murray Smith & Associates. This exhibit shows numbered pipes and junctions. The following hydraulic pipe and junction data tables show the modeled flows, pressures and hydraulic data for this STEP system. The hydraulic profile in Figure 4 shows the design hydraulic grades derived by Murray Smith & Associates. This report considers those design hydraulic grades to be unreliable. This report presents a rational basis for revising the existing STEP hydraulics and designing the proposed STEP system as described below. Because of this, the proposed hydraulic profiles shown in Figures 5 through 7 are different than that shown in Figure 4.

Proposal: Existing STEP system + Amazing Facts Project - Phase I: The Phase I project proposes to install the church sewer pump station sized for the total project. The project proposes to connect a 3" STEP low pressure sewer line to the existing Cavitt Ranch 3" STEP sewer at Cavitt Ranch Place. The point of connection is shown on Map 2 at about 1,000 feet southwest of this project's south line. In order to accommodate Phase II and potential ultimate residential development to the east, an empty 4" STEP low pressure sewer line is proposed to be laid in the same trench as the 3"

STEP line. The 4" STEP sewer line is needed to serve the total project plus ultimate development to the east, but if it were connected to the existing 3" STEP line, it would contradict Placer County's preference to keep all STEP lines from decreasing in size as they proceed downstream.

Exhibit 2 shows a schematic pipe layout for the existing STEP system plus Project (Phase I). The hydraulic results of the proposed design flows are shown in the data tables following Exhibit 2. Flow results are shown for 1 and 2 project pumps running. The results of these calculations are used to determine the impacts to the Cavitt Ranch STEP pumps already in operation as discussed in Section 8.

Proposal: Existing STEP system + Project (All Phases): This project's Phase II sewer improvements are shown on Map 2 and are listed herein. These improvements would include:

1. Disconnecting the existing offsite 3" STEP sewer line built in Phase I and connecting the empty 4" STEP sewer line.
2. Upsizing 1,500 lineal feet of existing 3" STEP sewer line with 4" STEP sewer line between King Ranch Place and Cavitt Ranch Place.
3. Upsizing the 3" STEP sewer pipe and sewer flow meter under Sierra College Drive at King Ranch Place to 4".

Exhibit 3 shows a schematic pipe layout for the existing STEP system plus Project (All Phases). The hydraulic results of the proposed design flows are shown in the data tables following Exhibit 3. Flow results are shown for 1 and 2 project pumps running. The results of these calculations are used to determine the impacts to the Cavitt Ranch STEP pumps already in operation as discussed in Section 8.

Accommodation for future: Existing STEP system + Project (All Phases) + Ultimate Development: The ultimate development added to this project's flow consists of up to 36 future EDU's from the Placer UGA, east of this project. The next project to develop, whether it is this project's Phase II or the remaining Placer UGA development, that project would construct the off site sewer improvements listed above and shown on Map 2.

Exhibit 4 shows a schematic pipe layout for this scenario. Flow results are shown for 2 project pumps running with simultaneous peak residential flow from 67 EDU's. Conservative project pump discharge rates are shown in Figure 2 to determine the storage volume utilized in the project pump tank. Figure 3 shows emergency reserve volume provided in the project pump tank.

Hydraulic Calculations and Conclusions

The hydraulic calculations for the STEP sewer system are performed with the Haestad WaterCad computer program based on a Hardy Cross analysis and Hazen Williams formula. The Hardy Cross analysis calculates flows and pressures, given the inflows at various junctions, the known elevation of the point of discharge and the project pump hydraulic data. The Hazen Williams formula calculates the head loss in the pipes due to friction. That formula, in English units, is expressed as: $V=1.318\ CR^{0.63}\ S^{0.54}$. V is velocity, C is the pipe friction coefficient, R is hydraulic radius and S is the head loss per foot of pipe or head loss gradient. Four operating scenarios are presented. They are (1) The existing STEP system design in Cavitt Ranch prepared by Murray Smith & Associates and (2) The existing + Project (Phase I) condition and (3) The existing + Project (All Phases) condition and (4) The existing + Project (All Phases) + ultimate condition. The STEP sewer

system is shown schematically in Exhibits 1 through 4. Each exhibit is followed by hydraulic data summary tables showing design pressures, flow rates and velocities for each scenario. Project pump input data shown in Tables H5, H8 and H11 are taken from three points on the PF5010 pump curve shown in the Appendix. All other input data for junction inflow, pipe sizes, friction C values and elevations are listed along with output data in the hydraulic data summary tables H1 through H11. From these calculations, this report concludes:

Existing STEP system + Project (Phase I):

1. There will be an increase to some of the design hydraulic grades in the existing Cavitt Ranch STEP system. The Cavitt Ranch design hydraulic grades shown on the Record Drawings are not considered reliable. Placer County has inventoried nine existing residential pumps in Cavitt Ranch. Table 10 in Section 8 lists four existing residential pumps that will need to be replaced by this project in Phase I as mitigation to the increased head caused by this project.
2. This project's minimum design pumping rate with two pumps on is 61 gpm, which is sufficient for Phase I peak flows.
3. The design peak flow to the SPMUD system at MH RKLN 01 for this scenario is 151 gpm.

Existing STEP system + Project (All Phases):

1. With the proposed upsizing of offsite 3" STEP sewer lines, there will be no new impacts to the existing Cavitt Ranch STEP system.
2. This project's minimum design pumping rate with two pumps on is 111 gpm, which is sufficient for the peak flows from the total project.
3. The design peak flow to the SPMUD system at MH RKLN 01 for this scenario is 201 gpm. This is the new maximum flow rate reported to SPMUD for their review of their existing sewer system capacity (refer to their letter in the Appendix).

Existing STEP system + Project (All Phases) + ultimate (36 EDU's):

1. Ultimate peak flow from 36 potential, future EDU's from Placer UGA is added to this project's pumped flow.
2. There will be no new impacts to the existing Cavitt Ranch STEP system, as the previous four residential pump upsizings and the offsite 3" STEP sewer upsizing will accommodate this flow condition.
3. This project's minimum design pumping rate with two pumps on is 91 gpm.
4. The design peak flow to the SPMUD system at MH RKLN 01 for this scenario is 196 gpm. This is nearly the same as the scenario above because the church pump discharge flow rate will decrease by an amount nearly equal to the increase in peak flow from the 36 future EDU's.

8.0 IMPACTS AND MITIGATIONS

8.01 Annexation to SMD 2

Impact:

Sewer service to this project represents an impact to Placer County SMD 2, the SPMUD sewer system and the SPWA system. Without annexation, there would be disorder. Annexation is the process needed to assess the impacts, determine the available capacity, collect the fees and update the mapping to the sewer system.

Mitigation:

Annexation of this project's property will be required in order to allow sewer service through Placer County SMD 2. Placer County Board of Supervisor's approval will be required for annexation into SMD 2 after approval by SPWA for modification of its service area boundary. In addition, modification of the agreement between SPMUD and Placer County is required.

8.02 Collection/ Conveyance System

Impact 1. Existing and proposed STEP Sewer System:

1. There is a recurring service maintenance user fee charged to the Project by the Sewer District for maintenance and emergency response. The current fee is $24.40 per month per EDU, which is in addition to the normal maintenance and operations fee. The project's EDU count is 14 for Phase I and 16 for all phases as derived in Table 6 above.
2. With this project connecting to the existing STEP sewer system and no service pump or pipe upsizing provided, there would be an increase in the design pressures in the existing STEP system. This could be an adverse effect to the existing pumps unless mitigated. The maximum pressures will occur with the Project's Phase I improvements. The maximum increase in design pressure at any location is 21 psi. The maximum design pressure will occur at Polo Ranch Place, in Cavitt Ranch and will be 110 psi, an increase of 4 psi above the original design. The maximum pressures proposed for the Phase II improvements will be slightly less, due to pipe upsizing. All STEP system piping in Cavitt Ranch is PVC, schedule 40, which is designed to withstand this pressure.

Mitigation 1.For impacts to the STEP Sewer System from the proposed Project:

1. The cost of the on-lot component of the STEP system will be borne by the Project Applicant (Amazing Facts, Inc.).
2. Paved access shall be provided to each sewer manhole and STEP system equipment. Such access shall have a structural section designed for HS20 loadings with a minimum structural section of 3" AC over 8" AB unless otherwise approved by Placer County Environmental Engineering, minimum width of 12 feet with one foot wide AB shoulders and a minimum centerline radius of 50 feet. Configurations shall provide for access by County sewer maintenance vehicles and shall either be a through connector road or shall have an applicable turnaround. The project will need to provide easement rights for County personnel's access and hold the County harmless for damages that may occur due to maintenance and vehicle access. On site STEP service and tank locations and paved access shall be identified on the project improvement plans.
3. Project Phase I: The Project Applicant will be responsible for replacing four residential sewer service pumps, at lots 20, 22, 27 and 29 of Cavitt Ranch Subdivision. At these four lots, this project will be responsible for the cost of the replacement pump, all appurtenant equipment and cost of installation of the replaced pump (Placer County will actually do the work of installing the pumps and appurtenant equipment).
4. Project Phase II or Placer UGA development: Phase II of this project or the developer of Placer UGA to the east of this project, whichever is developed first, will be responsible for replacing about 1,500 feet of existing 3 inch STEP sewer main with 4 inch pressure pipe from Cavitt Ranch Place to Manhole RKLN 01 to offset the proposed increase in flow rate and pressure to the existing STEP system. This mitigation work will include disconnecting from the existing 3" and connecting to the empty 4" STEP line placed by

the Phase I development along Sierra College Boulevard. The disconnected 3" STEP line will be capped and abandoned. The 3" sewer line to be replaced in the King's Ranch Place intersection may necessarily be done at night to reduce impacts to traffic control. This 3" pipe replacement may be done by pipe bursting procedure, if open cut excavation is infeasible due to interference with existing utilities. This mitigation work will also include upsizing an existing 3" sewer flow meter to 4". These pipe replacements will accommodate the proposed higher flow rates and slightly decrease the design pressures in the existing STEP system from those created by the Phase I improvements.

5. Placer County shall approve improvement plans for the design of the on site and off site sewer system. Project Applicant shall obtain easement and encroachment permit for off site STEP main to be built along and under Sierra College Boulevard. Improvement plans for construction of public sewer is subject to review and approval by the Placer County Facilities Services Environmental Engineering Division, Placer County ESD and SPMUD. Note that a maintenance agreement for the STEP tank will be completed with Environmental Engineering Division before improvement plans are approved.
6. Table 10 below shows an inventory of the changes to the Cavitt Ranch STEP system design hydraulic grade elevations proposed by this project. Table 10 also shows an inventory of nine existing residential sewer pumps and their design heads. The pump at lot 5 was incorrectly sized for the existing design and should be replaced with a PF1010 pump by others, since it is not the responsibility of this project. Using the criteria listed in Section 3, this report calculates that the original design heads for lots 10, 12 and 16 are over 40 feet too high. That means these pumps may be operating off their curves. If these pumps are working satisfactorily, they can remain in place. Otherwise, they should be replaced with model PF1005 FC (flow control). The model PF1005 FC would have to be added to the Placer County maintenance inventory, since it is not currently being stocked. This Project will have negligible effect to these pumps as demonstrated by the calculation on page 18.
7. If this project is approved and constructed as proposed, it is recommended that the design hydraulic grade elevations shown on the Cavitt Ranch Record Drawings then be replaced with the design hydraulic grade proposed by this project.

TABLE 10
IMPACTS TO EXISTING STEP SEWER SYSTEM CAUSED BY AMAZING FACTS PROJECT
INCLUDING HYDRAULIC AND SERVICE PUMP INVENTORY AT CAVITT RANCH

	Existing Hydraulic Design Data Prepared By Murray Smith & Associates					**Highest Proposed Hydraulic Design Data** (Note 5)			
col. #	1	2	3	4	5	6	7	8	9
Cavitt Ranch Lot #	Existing Service Elevation ft.	Existing Design Hydraulic Grade at Service ft.	TDH- Total Design Head at Service ft.	Existing Pump Model	Design Pump Head ft.	Highest Proposed Design Hydraulic Grade at Service ft.	Proposed TDH - Total Design Head at Service ft.	Diff. in TDH (col 8-col 3) ft.	Remarks
1	259.5	504.5	245			513	253.5	8.5	
2	257.5	503.5	246			512.5	255	9	
3	264	501	237	**P1010**	231	510.6	246.6	9.6	Exist. P1010 pump ok at 241' design head
4	264.1	503.1	239			512.1	248	9	
5	269.2	504.2	235	**P2010**	none	512.8	243.6	8.6	Pump improperly sized for exist. head. Should be same a lot 3. Change to PF1007 (note 3)
6	405.2	503.2	98			498.6	93.4	-4.6	
7	409	506	97			499	90	-7	
8	404.2	504.2	100			498.8	94.6	-5.4	
9	400	503	103			498.5	98.5	-4.5	
10	438.5	532.5	94	**P1005**	104	491.6	53.1	-40.9	Exist. P1005 pump, 63' design head, see note 2
11	437	535	98			492.1	55.1	-42.9	
12	442.1	529.1	87	**P1005**	93	490.8	48.7	-38.3	Exist. P1005 pump, 55' design head, see note 2
13	448.8	496.8	48			491.5	42.7	-5.3	
14	464.1	478.1	14			478.3	14.2	0.2	
15	488.2	492.2	4			540.7	52.5	48.5	
16	439	529	90	**P1005**	101	490.8	51.8	-38.2	Exist. P1005 pump, 63' design head, see note 2
17	446.2	511.2	65			485.6	39.4	-25.6	
18	430.2	488.2	58			479	48.8	-9.2	
19	446.3	485.3	39			478.1	31.8	-7.2	
20	480.7	509.7	29	**WEO5H**	31	549.5	68.8	39.8	**Replace pump with PF1005 FC** (71' Des. Head)
21	470.5	518.5	48			550.8	80.3	32.3	
22	464.2	521.2	57	**WE15H**	71	551	86.8	29.8	**Replace pump with PF1005 FC** (101' Des. Head)
23	464.2	521.2	57			551	86.8	29.8	
24	457.4	520.4	63			551	93.6	30.6	
25	462	518	56			550.7	88.7	32.7	
26	462.7	515.7	53			550.3	87.6	34.6	
27	466.4	508.4	42	**WEO512**	none	549.6	83.2	41.2	**Replace pump with PF1005 FC** (84' Des. Head)
28	479.5	505.5	26			549	69.5	43.5	
29	495.8	499.8	4	**WEO3L**	9	548	52.2	48.2	**Replace pump with PEF 75 or PF1005 FC** (57'
30	495.4	495.4	0			544.5	49.1	49.1	
31	492.5	492.5	0			540.7	48.2	48.2	

Notes:

1) These pump models are from Orenco Systems, Inc. (1-800-348-9843). The WE and WE0 series are older low head effluent pump models and the PEF series are equivalent newer models.
2) The original design heads for lots 10, 12 and 16 are over 40' too high. The existing pumps may presently be operating off their pump curves. If they are working, then leave in place. Otherwise replace with PF1005FC (not in current County inventory). This Project will have negligible effect on these pumps, per mitigation 1.6 on page 14 and calculation on page 18.
3) This pump is incorrectly sized for existing head. It should be changed to a PF1007 pump. This is not the responsibility of the Amazing Facts Project, since there is no new impact if the pump were the correct one.
4) The PF series pumps are the newer models that replace the old P series pumps. PF1005FC are not pump models that Placer County currently uses in their inventory.
5) The highest proposed design heads occur with construction of the existing + Project (Phase I) scenario. The subsequent scenarios will have slightly lower design heads due to upsizing sewer lines described in Section 8.

Impact 2. Existing SPMUD Gravity Sewer Collection System:
The gravity sewer collection system is operated and maintained by the South Placer Municipal Utility District. Unless there is sufficient hydraulic capacity in the existing gravity sewer system, the additional wastewater peak flow from this project may be an adverse impact. In 2009, SPMUD stated in a letter, copied in the Appendix, that there was adequate collection sewer capacity for this project, based on peak flow.

Mitigation 2. For Impacts to Existing SPMUD Gravity Sewer System:
Prior to improvement plan approval, the applicant shall submit an updated available capacity letter from SPMUD to Placer County. SPMUD and SMD 2 shall approve a modification to their Wastewater Services Agreement to account for this project.

8.03 Existing Wastewater Treatment Plant

Impact:
Wastewater treatment is provided by the City of Roseville pursuant to the SPWA Operations Agreement for properties within the SPWA SAB. SMD 2 also has a treatment contract with the City of Roseville. This site is not within the SPWA SAB, but is within the Placer UGA adjacent to the SAB. The SPWA 2007 Wastewater Systems Evaluation Project treats the 630 acres in the Placer UGA as a "point source" in its hydraulic sewer model. For the Placer UGA, the Evaluation Project modeled an average dry weather flow (ADWF) of 10,000 gallons per day (gpd). This project (all phases) will produce between 3,040 and 6,978 gpd ADWF and fits within the Evaluation Project model.

This project is proposed as a STEP service. The effluent from STEP services has lower biochemical oxygen demand (BOD) and suspended solids (SS) compared to that from a gravity sewer service. The benefit of these lower constituents may be partially offset by the need for the WWTP to periodically take pumped septic tank effluent from this project's septic tank. There is an existing chemical building at King Ranch Place that is able to mitigate odors from the STEP sewer lines, if needed.

Mitigation:
Prior to service, an approval action for the modification of the SAB to include this property will be required by the SPWA after this project's environmental document is certified. The project's septic and grease trap tanks shall be maintained to minimize pump screen plugging and to minimize solids form being pumped into the STEP system. These tanks' bottom solids levels and top scum thicknesses shall be periodically checked and the contents pumped in accordance with the requirements of the Placer County Facilities Services Environmental Engineering Division. Typically the grease interceptor tank contents will be sent by licensed septic hauler to a treatment facility or licensed grease rendering facility. The existing chemical building dosing capacity shall be reviewed to determine if it is sufficient for the proposed increased flows. Placer County is requiring the 3" flow meter that controls chemical injection to be upsized to a 4" flow meter as part of the Phase II offsite improvements.

8.04 Recycled Water

Impact and Mitigation:

The SPWA Evaluation Project states that all UGA's must provide their own recycled water storage. There is no infrastructure for recycled water anywhere close to the Placer UGA, but it is assumed that this project, once brought into the SPWA Service Area Boundary, would be included in all aspects of any applicable future expansion of the SPWA recycled water project.

9.0 REFERENCES

1. Bounds, T.R., (1996) "Alternative Sewer Design" Orenco Systems, Inc.
2. Metcalf & Eddy, Inc. *Wastewater Engineering: Treatment, Disposal, Reuse.* New York: McGraw Hill,1991
3. Orenco Systems, Inc. 2008 pump curves
4. *Sewer Rates and Charges*, City of Roseville Municipal Code, Chapter 14.16
5. *South Placer Regional Wastewater and Recycled Water Systems Evaluation Final Repor*t, 2007, RMC
6. California Plumbing Code, (2007), California Building Standards Commission, Sacramento, CA.

HYDRAULIC CALCULATIONS

The following hydraulic calculations for the STEP sewer system are performed with the Haestad WaterCad computer program based on a Hardy Cross analysis and Hazen Williams formula. The Hardy Cross analysis calculates flows given the inflows at various junctions, the known elevation of the point of discharge and the project pump hydraulic data. The Hazen Williams formula calculates the head loss in the pipes due to friction. That formula, in English units, is expressed as: $V=1.318\ CR^{0.63}\ S^{0.54}$. V is velocity, C is the pipe friction coefficient, R is hydraulic radius and S is the head loss per foot of pipe or head loss gradient. Four operating conditions are presented below.
(1) The existing STEP system (31 EDU) design in Cavitt Ranch
(2) The existing STEP (31 EDU) + Project – Phase I condition
(3) The existing STEP (31 EDU) + Project – Phase II condition
(4) The existing STEP (31 EDU) + Project – All Phases + ultimate condition (36 EDU).

For hydraulic calculations, the STEP sewer system is shown in schematic exhibits of pipes and nodes. Each exhibit is followed by hydraulic data summary tables showing design pressures, flow rates and velocities for the STEP system. Project pump input data shown in Tables H5, H8 and H11 are taken from three points on the PF5010 pump curve shown in the Appendix. All other input data for junction inflow, pipe sizes, friction C values and elevations are listed along with output data in the hydraulic data summary tables.

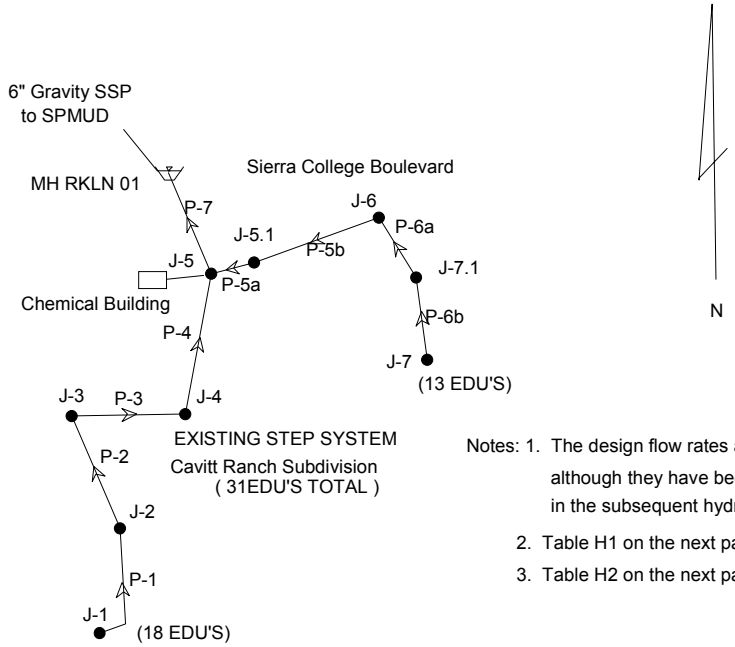
Mitigation 1.6 on page 14 refers to the following calculation that is derived from the hydraulic calculations listed in this section. This Project's Phase I improvement is predicted to slightly increase the design head to the existing service pumps at lots 10, 12 and 16 in Cavitt Ranch Subdivision as follows. The original design flow in the 3" pipe P-7 is 120 gpm. At 120 gpm, the head loss in Pipe P-7 calculates to 0.0436 x 108' = 4.7 feet. The proposed design head loss in Pipe P-7, calculated at 151 gpm will be 0.069 x 108'= 7.5 feet. The total predicted increase in design head to lots 10, 12 and 16 is 3.2 feet, which will be negligible to the pump performance. The ultimate condition (4) listed above is predicted to reduce by 0.4 feet, the design head to these pumps. With either condition, the affect to these pumps will be negligible. The design criteria in this report predicts that the original design head for these pumps is over 40 feet too high and that is the reason this report concludes that those pumps are probably performing off their pump curves. The pumps may still perform under these conditions and still not draw too many amperes of current. It may be possible to leave these pumps in place, if they are presently working satisfactorily.

EXHIBIT 1

SMD #2 EXISTING STEP SYSTEM - CAVITT RANCH ALONE

HYDRAULIC MODEL SCHEMATIC LAYOUT

April 4, 2011



Notes: 1. The design flow rates and hydraulic grades are those shown on the Cavitt Ranch Record Drawings although they have been derived incorrectly. These flow rates are not the same as those used in the subsequent hydraulic models shown in Exhibits 2 through 4.

2. Table H1 on the next page lists the junction elevations and pressures.

3. Table H2 on the next page lists the pipe data, flows and friction losses.

HYDRAULIC DATA SUMMARIES FOR EXISTING STEP SYSTEM AT CAVITT RANCH

TABLE H1
EXISTING STEP SYSTEM DESIGN HYDRAULIC SUMMARY - JUNCTIONS

See Exhibit 1 For Schematic Pipe Layout

Existing STEP System Design (31 EDU)

Junct Label	Junction Elevation (ft)	No. of EDU's @ junct	Type of Flow at Junction	Junction Inflow (gpm)	Hydraulic Grade at Junction (ft)	Pressure at Junct (psi)	Remarks
J-1	261		Inflow	No calc	505.6	105.91	
J-2	407.8		Inflow	No calc	486.1	33.9	
J-3	440.9		Inflow	No calc	488.7	20.7	
J-4	437		Inflow	No calc	531.2	40.79	
J-5	466.6		Inflow	No calc	478.23	5.04	
J-5.1	468		Inflow	No calc	468	0	gravity flow shown in pipes P-5a, P-5b and P-6a
J-6	490.8		Inflow	No calc	491	0	gravity flow shown in pipes P-5a, P-5b and P-6a
J-7	463		Inflow	No calc	519.6	24.5	
J-7.1	495		Inflow	No calc	496.5	0.6	gravity flow shown in pipes P-5a, P-5b and P-6a

TABLE H2
EXISTING STEP SYSTEM HYDRAULIC SUMMARY - PIPES

See Exhibit 1 for Schematic Pipe Layout

Existing SMD #2 STEP System

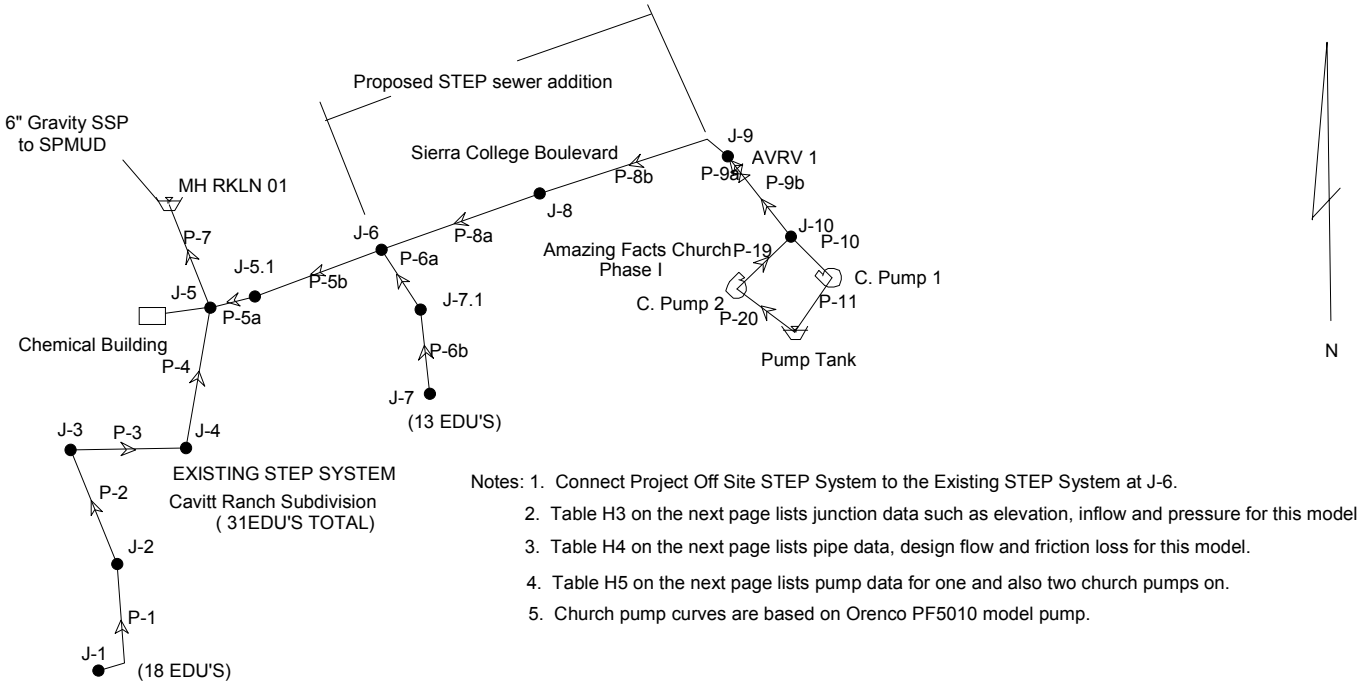
Pipe Label	Pipe Length (ft)	Pipe Diameter (in)	Pipe Material	Hazen-Williams C	Velocity (ft/s)	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-1	1,408.00	2.5	PVC	130	2.64	Open	40	505.6	486.1	19.5	13.9
P-2	1,450.00	3	PVC	130	2.65	Open	60	486.1	488.7	-2.6	11.3
P-3	410	3	PVC	130	2.65	Open	60	488.7	531.2	-42.5	11.3
P-4	1,386.00	3	PVC	130	5.5	Open	120	531.2	478.23	52.97	43.6
P-5a	100.00	3	PVC	130	4.07	Open	90	468	478.23	gravity flow	25
P-5b	1,302.00	3	PVC	130	4.07	Open	90	491	478.23	gravity flow	25
P-6a	590	3	PVC	130	4.07	Open	90	496.5	491	gravity flow	25
P-6b	900.00	3	PVC	130	4.07	Open	90	519.6	496.5	23.1	25
P-7	108.00	3	PVC	130	5.5	Open	120	478.23	467.15	11.08	43.6

EXHIBIT 2

SMD #2 STEP SYSTEM - CAVITT RANCH PLUS AMAZING FACTS CHURCH PROJECT (PHASE I)

HYDRAULIC MODEL SCHEMATIC LAYOUT

April 4, 2011



Notes: 1. Connect Project Off Site STEP System to the Existing STEP System at J-6.

2. Table H3 on the next page lists junction data such as elevation, inflow and pressure for this model.

3. Table H4 on the next page lists pipe data, design flow and friction loss for this model.

4. Table H5 on the next page lists pump data for one and also two church pumps on.

5. Church pump curves are based on Orenco PF5010 model pump.

TABLE H3
EXISTING STEP SYSTEM PLUS PROJECT- PHASE I HYDRAULIC SUMMARY - JUNCTIONS

See Exhibit 2 For Schematic Pipe Layout

For Convenient Comparison Purposes, the Existing STEP System Junction DesignData is copied into this Table.

Junct Label	Junction Elevation (ft)	No. of EDU's @ junct	Type of Flow at Junction	Junction Inflow (gpm)	Hydraulic Grade at Junction (ft)	Pressure at Junct (psi)	Remarks
Existing STEP System Design (31 EDU)							
J-1	261		Inflow	No calc	505.6	105.91	
J-2	407.8		Inflow	No calc	486.1	33.9	
J-3	440.9		Inflow	No calc	488.7	20.7	
J-4	437		Inflow	No calc	531.2	40.79	
J-5	466.6		Inflow	No calc	478.23	5.04	
J-5.1	468		Inflow	No calc	468	0	gravity flow shown in pipes P-5a, P-5b and P-6a
J-6	490.8		Inflow	No calc	491	0	gravity flow shown in pipes P-5a, P-5b and P-6a
J-7	463		Inflow	No calc	519.6	24.5	
J-7.1	495		Inflow	No calc	496.5	0.6	gravity flow shown in pipes P-5a, P-5b and P-6a
Existing SMD #2 STEP System (31 EDU) plus Project- Phase I (single pump on)							
The Design Flows in the Existing Cavitt Ranch STEP system have been changed based on a Rational Design for this model							
J-1	261	9	Inflow	30	512.66	108.88	
J-2	407.8	0	Inflow	0	498.57	39.27	
J-3	440.9	1	Inflow	10	493.56	22.78	
J-4	437	8	Inflow	20	491.15	23.43	
J-5	466.6	0	Inflow	-30	473.85	3.14	Where two branches join, flow may be subtracted from system to account for probablistic model for the number of pumps on simultaneously
J-5.1	468	0	Demand	0	477.67	4.18	
J-6	490.8	0	Demand	0	527.37	15.82	
J-7	463	9	Inflow	30	538.9	32.84	
J-7.1	495	4	Inflow	30	535.47	17.51	
J-8	506	0	Demand	0	535.74	12.87	
J-9	515	0	Demand	0	541.74	11.57	
J-10	479	0	Demand	0	545.71	28.86	
Existing SMD #2 STEP System (31 EDU) plus Project Phase I - (two pumps on)							
The Design Flows in the Existing Cavitt Ranch STEP system have been changed based on a Rational Design for this model							
J-1	261	9	Inflow	30	513.67	109.32	
J-2	407.8	0	Inflow	0	499.58	39.71	
J-3	440.9	1	Inflow	10	494.57	23.22	
J-4	437	8	Inflow	20	492.15	23.86	
J-5	466.6	0	Inflow	-30	474.86	3.57	Where two branches join, flow may be subtracted from system to account for probablistic model for the number of pumps on simultaneously
J-5.1	468	0	Demand	0	479.44	4.95	
J-6	490.8	0	Demand	0	539.1	20.9	
J-7	463	9	Inflow	30	550.64	37.92	
J-7.1	495	4	Inflow	30	547.21	22.59	
J-8	506	0	Demand	0	551.37	19.63	
J-9	515	0	Demand	0	560.15	19.53	
J-10	479	0	Demand	0	565.97	37.63	

TABLE H4
EXISTING STEP SYSTEM PLUS PROJECT - PHASE I HYDRAULIC SUMMARY - PIPES

See Exhibit 2 for Schematic Pipe Layout

For Convenient Comparison Purposes, the Existing STEP System Pipe Summary Data is copied into this Table

Pipe Label	Pipe Length (ft)	Pipe Diameter (in)	Pipe Material	Hazen-Williams C	Velocity (ft/s)	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
Existing SMD #2 STEP System											
P-1	1,408.00	2.5	PVC	130	2.64	Open	40	505.6	486.1	19.5	13.9
P-2	1,450.00	3	PVC	130	2.65	Open	60	486.1	488.7	-2.6	11.3
P-3	410	3	PVC	130	2.65	Open	60	488.7	531.2	-42.5	11.3
P-4	1,386.00	3	PVC	130	5.5	Open	120	531.2	478.23	52.97	43.6
P-5a	100.00	3	PVC	130	4.07	Open	90	468	478.23	gravity flow	25
P-5b	1,302.00	3	PVC	130	4.07	Open	90	491	478.23	gravity flow	25
P-6a	590	3	PVC	130	4.07	Open	90	496.5	491	gravity flow	25
P-6b	900.00	3	PVC	130	4.07	Open	90	519.6	496.5	23.1	25
P-7	108.00	3	PVC	130	5.5	Open	120	478.23	467.15	11.08	43.6
Existing SMD #2 STEP System (31 EDU) plus Project - Phase I (single pump on)											
The Design Flows in the Existing Cavitt Ranch STEP system have been changed based on a Rational Design for this model											
P-1	1,408.00	2.46	PVC	120	2.03	Open	30	512.66	498.57	14.09	10.01
P-2	1,450.00	3.06	PVC	120	1.31	Open	30	498.57	493.56	5.01	3.46
P-3	410	3.06	PVC	120	1.75	Open	40	493.56	491.15	2.41	5.89
P-4	1,386.00	3.06	PVC	120	2.62	Open	60	491.15	473.85	17.3	12.48
P-5a	100	3.06	PVC	120	4.79	Open	109.73	477.67	473.85	3.82	38.17
P-5b	1,302.00	3.06	PVC	120	4.79	Open	109.73	527.37	477.67	49.7	38.17
P-6a	590	3	PVC	120	2.72	Open	60	535.47	527.37	8.11	13.74
P-6b	900	3	PVC	120	1.36	Open	30	538.9	535.47	3.43	3.81
P-7	108	3.06	PVC	120	6.1	Open	139.73	473.85	467.4	6.45	59.72
P-8a	950	3.06	PVC	120	2.17	Open	49.73	535.74	527.37	8.37	8.82
P-8b	680	3.06	PVC	120	2.17	Open	49.73	541.74	535.74	5.99	8.82
P-9a	1	3.06	PVC	120	2.17	Open	49.73	541.75	541.74	0.01	8.79
P-9b	450	3.06	PVC	120	2.17	Open	49.73	545.71	541.75	3.97	8.82
P-10	50	2	PVC	120	0	Open	0	545.71	545.71	0	0
P-11	5	2	PVC	120	0	Open	0	478	478	0	0
P-19	50	2	PVC	120	5.08	Open	49.74	549.21	545.71	3.5	69.96
P-20	5	2	PVC	120	5.08	Open	49.74	478	477.65	0.35	69.96
Existing SMD #2 STEP System (31 EDU) plus Project - Phase I (2 pumps on)											
The Design Flows in the Existing Cavitt Ranch STEP system have been changed based on a Rational Design for this model											
P-1	1,408.00	2.46	PVC	120	2.03	Open	30	513.67	499.58	14.09	10.01
P-2	1,450.00	3.06	PVC	120	1.31	Open	30	499.58	494.57	5.01	3.46
P-3	410	3.06	PVC	120	1.75	Open	40	494.57	492.15	2.41	5.89
P-4	1,386.00	3.06	PVC	120	2.62	Open	60	492.15	474.86	17.3	12.48
P-5a	100	3.06	PVC	120	5.28	Open	121.11	479.44	474.86	4.58	45.82
P-5b	1,302.00	3.06	PVC	120	5.28	Open	121.11	539.1	479.44	59.66	45.82
P-6a	590	3	PVC	120	2.72	Open	60	547.21	539.1	8.11	13.74
P-6b	900	3	PVC	120	1.36	Open	30	550.64	547.21	3.43	3.81
P-7	108	3.06	PVC	120	6.59	Open	151.11	474.86	467.4	7.46	69.04
P-8a	950	3.06	PVC	120	2.67	Open	61.11	551.37	539.1	12.27	12.91
P-8b	680	3.06	PVC	120	2.67	Open	61.11	560.15	551.37	8.78	12.91
P-9a	1	3.06	PVC	120	2.67	Open	61.11	560.16	560.15	0.01	12.88
P-9b	450	3.06	PVC	120	2.67	Open	61.11	565.97	560.16	5.81	12.91
P-10	50	2	PVC	120	3.12	Open	30.56	567.39	565.97	1.42	28.38
P-11	5	2	PVC	120	3.12	Open	30.56	478	477.86	0.14	28.38
P-19	50	2	PVC	120	3.12	Open	30.56	567.39	565.97	1.42	28.38
P-20	5	2	PVC	120	3.12	Open	30.56	478	477.86	0.14	28.38

TABLE H5
EXISTING STEP SYSTEM PLUS PROJECT - PHASE I HYDRAULIC SUMMARY - PROJECT PUMPS

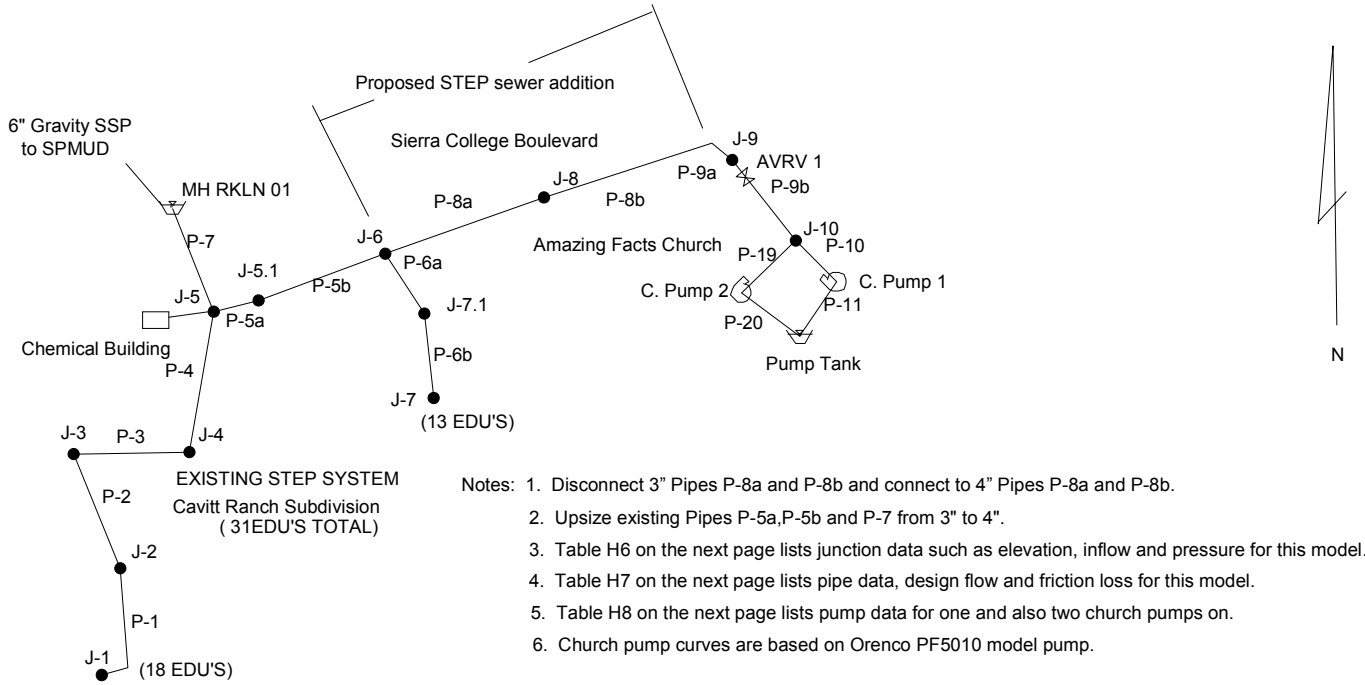
Pump Label	Pump Elevation (ft)	Pump Curve Data: Shutoff Head (ft)	Shutoff Discharge (gpm)	Design Head (ft)	Design Discharge (gpm)	Maximum Operating Head (ft)	Maximum Operating Discharge (gpm)	Control Status	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Pump Discharge (gpm)	Pump Head (ft)	Calculated Water Power (Hp)
Existing SMD #2 STEP System (31 EDU) plus Project - Phase I (single pump on) - See Exhibit 2													
C. Pump	474	110	0	81	40	61	60	Off	478	545.71	0	0	0
C. Pump	474	110	0	81	40	61	60	On	477.65	549.21	49.74	71.56	0.9
Existing SMD #2 STEP System (31 EDU) plus Project - Phase I (two pumps on) - See Exhibit 2													
C. Pump	474	110	0	81	40	61	60	On	477.86	567.39	30.56	89.53	0.69
C. Pump	474	110	0	81	40	61	60	On	477.86	567.39	30.56	89.53	0.69
										Total Discharge =	61.12		

EXHIBIT 3

SMD #2 STEP SYSTEM - CAVITT RANCH PLUS AMAZING FACTS CHURCH PROJECT (ALL PHASES)

HYDRAULIC MODEL SCHEMATIC LAYOUT

April 4, 2011



Notes:
1. Disconnect 3" Pipes P-8a and P-8b and connect to 4" Pipes P-8a and P-8b.
2. Upsize existing Pipes P-5a,P-5b and P-7 from 3" to 4".
3. Table H6 on the next page lists junction data such as elevation, inflow and pressure for this model.
4. Table H7 on the next page lists pipe data, design flow and friction loss for this model.
5. Table H8 on the next page lists pump data for one and also two church pumps on.
6. Church pump curves are based on Orenco PF5010 model pump.

TABLE H6
EXISTING STEP SYSTEM PLUS PROJECT - ALL PHASES HYDRAULIC SUMMARY - JUNCTIONS

See Exhibit 3 For Schematic Pipe Layout

For Convenient Comparison Purposes, the Existing STEP System Junction DesignData is copied into this Table.

Junct Label	Junction Elevation (ft)	No. of EDU's @ junct	Type of Flow at Junction	Junction Inflow (gpm)	Hydraulic Grade at Junction (ft)	Pressure at Junct (psi)	Remarks
Existing STEP System Design (31 EDU)							
J-1	261		Inflow	No calc	505.6	105.91	
J-2	407.8		Inflow	No calc	486.1	33.9	
J-3	440.9		Inflow	No calc	488.7	20.7	
J-4	437		Inflow	No calc	531.2	40.79	
J-5	466.6		Inflow	No calc	478.23	5.04	
J-5.1	468		Inflow	No calc	468	0	gravity flow shown in pipes P-5a, P-5b and P-6a
J-6	490.8		Inflow	No calc	491	0	gravity flow shown in pipes P-5a, P-5b and P-6a
J-7	463		Inflow	No calc	519.6	24.5	
J-7.1	495		Inflow	No calc	496.5	0.6	gravity flow shown in pipes P-5a, P-5b and P-6a
Existing SMD #2 STEP System (31 EDU) plus Project (single pump on)							
The Design Flows in the Existing Cavitt Ranch STEP system have been changed based on a Rational Design for this model							
J-1	261	9	Inflow	30	508.98	107.29	
J-2	407.8	0	Inflow	0	494.89	37.68	
J-3	440.9	1	Inflow	10	489.88	21.19	
J-4	437	8	Inflow	20	487.46	21.83	
J-5	466.6	0	Inflow	-30	470.17	1.54	Where two branches join, flow may be subtracted from system to account for probablistic model for the number of pumps on simultaneously
J-5.1	468	0	Demand	0	471.53	1.53	
J-6	490.8	0	Demand	0	489.18	-0.7	gravity flow in portion of pipes P5 and P8
J-7	463	9	Inflow	30	500.72	16.32	
J-7.1	495	4	Inflow	30	497.29	0.99	
J-8	506	0	Demand	0	493.21	-5.53	gravity flow in portion of pipes P5 and P8
J-9	515	0	Demand	0	496.09	-8.18	gravity flow in portion of pipes P5 and P8
J-10	479	0	Demand	0	522.7	18.91	
Existing SMD #2 STEP System (31 EDU) plus Project (two pumps on)							
The Design Flows in the Existing Cavitt Ranch STEP system have been changed based on a Rational Design for this model							
J-1	261	9	Inflow	30	510.52	107.96	
J-2	407.8	0	Inflow	0	496.43	38.35	
J-3	440.9	1	Inflow	10	491.42	21.86	
J-4	437	8	Inflow	20	489	22.5	
J-5	466.6	0	Inflow	-30	471.71	2.21	Where two branches join, flow may be subtracted from system to account for probablistic model for the number of pumps on simultaneously
J-5.1	468	0	Demand	0	474.02	2.6	
J-6	490.8	0	Demand	0	504.07	5.74	
J-7	463	9	Inflow	30	515.61	22.76	
J-7.1	495	4	Inflow	30	512.18	7.43	
J-8	506	0	Demand	0	513.95	3.44	
J-9	515	0	Demand	0	521.02	2.6	
J-10	479	0	Demand	0	538.73	25.84	

TABLE H7
EXISTING STEP SYSTEM PLUS PROJECT - ALL PHASES HYDRAULIC SUMMARY - PIPES

See Exhibit 3 for Schematic Pipe Layout

For Convenient Comparison Purposes, the Existing STEP System Pipe Summary Data is copied into this Table

Pipe Label	Pipe Length (ft)	Pipe Diameter (in)	Pipe Material	Hazen-Williams C	Velocity (ft/s)	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
Existing SMD #2 STEP System											
P-1	1,408.00	2.5	PVC	130	2.64	Open	40	505.6	486.1	19.5	13.9
P-2	1,450.00	3	PVC	130	2.65	Open	60	486.1	488.7	-2.6	11.3
P-3	410	3	PVC	130	2.65	Open	60	488.7	531.2	-42.5	11.3
P-4	1,386.00	3	PVC	130	5.5	Open	120	531.2	478.23	52.97	43.6
P-5a	100.00	3	PVC	130	4.07	Open	90	468	478.23	gravity flow	25
P-5b	1,302.00	3	PVC	130	4.07	Open	90	491	478.23	gravity flow	25
P-6a	590	3	PVC	130	4.07	Open	90	496.5	491	gravity flow	25
P-6b	900.00	3	PVC	130	4.07	Open	90	519.6	496.5	23.1	25
P-7	108.00	3	PVC	130	5.5	Open	120	478.23	467.15	11.08	43.6
Existing SMD #2 STEP System (31 EDU) plus Project (single pump on)											
The Design Flows in the Existing Cavitt Ranch STEP system have been changed based on a Rational Design for this model											
P-1	1,408.00	2.46	PVC	120	2.03	Open	30	508.98	494.89	14.09	10.01
P-2	1,450.00	3.06	PVC	120	1.31	Open	30	494.89	489.88	5.01	3.46
P-3	410	3.06	PVC	120	1.75	Open	40	489.88	487.46	2.41	5.89
P-4	1,386.00	3.06	PVC	120	2.62	Open	60	487.46	470.17	17.3	12.48
P-5a	100	4.02	PVC	120	3.25	Open	128.63	471.53	470.17	1.36	13.56
P-5b	1,302.00	4.02	PVC	120	3.25	Open	128.63	489.18	471.53	17.66	13.56
P-6a	590	3	PVC	120	2.72	Open	60	497.29	489.18	8.11	13.74
P-6b	900	3	PVC	120	1.36	Open	30	500.72	497.29	3.43	3.81
P-7	108	3.82	PVC	120	4.44	Open	158.63	470.17	467.4	2.77	25.64
P-8a	950	4.02	PVC	120	1.73	Open	68.63	493.21	489.18	4.03	4.24
P-8b	680	4.02	PVC	120	1.73	Open	68.63	496.09	493.21	2.88	4.24
P-9a	1	3.06	PVC	120	2.99	Open	68.63	496.11	496.09	0.02	15.99
P-9b	450	3.06	PVC	120	2.99	Open	68.63	522.7	515.5	7.2	16.01
P-10	50	2	PVC	120	0	Open	0	522.7	522.7	0	0
P-11	5	2	PVC	120	0	Open	0	478	478	0	0
P-19	50	2	PVC	120	7.01	Open	68.64	529.06	522.7	6.35	127.04
P-20	5	2	PVC	120	7.01	Open	68.64	478	477.36	0.64	127.04
Existing SMD #2 STEP System (31 EDU) plus Project (2 pumps on)											
The Design Flows in the Existing Cavitt Ranch STEP system have been changed based on a Rational Design for this model											
P-1	1,408.00	2.46	PVC	120	2.03	Open	30	510.52	496.43	14.09	10.01
P-2	1,450.00	3.06	PVC	120	1.31	Open	30	496.43	491.42	5.01	3.46
P-3	410	3.06	PVC	120	1.75	Open	40	491.42	489	2.41	5.89
P-4	1,386.00	3.06	PVC	120	2.62	Open	60	489	471.71	17.3	12.48
P-5a	100	4.02	PVC	120	4.33	Open	171.43	474.02	471.71	2.31	23.08
P-5b	1,302.00	4.02	PVC	120	4.33	Open	171.43	504.07	474.02	30.06	23.08
P-6a	590	3	PVC	120	2.72	Open	60	512.18	504.07	8.11	13.74
P-6b	900	3	PVC	120	1.36	Open	30	515.61	512.18	3.43	3.81
P-7	108	3.82	PVC	120	5.64	Open	201.43	471.71	467.4	4.31	39.9
P-8a	950	4.02	PVC	120	2.82	Open	111.43	513.95	504.07	9.88	10.4
P-8b	680	4.02	PVC	120	2.82	Open	111.43	521.02	513.95	7.07	10.4
P-9a	1	3.06	PVC	120	4.86	Open	111.43	521.06	521.02	0.04	39.31
P-9b	450	3.06	PVC	120	4.86	Open	111.43	538.73	521.06	17.67	39.27
P-10	50	2	PVC	120	5.69	Open	55.72	543.05	538.73	4.32	86.34
P-11	5	2	PVC	120	5.69	Open	55.72	478	477.57	0.43	86.34
P-19	50	2	PVC	120	5.69	Open	55.72	543.05	538.73	4.32	86.34
P-20	5	2	PVC	120	5.69	Open	55.72	478	477.57	0.43	86.34

TABLE H8
EXISTING STEP SYSTEM PLUS PROJECT - ALL PHASES HYDRAULIC SUMMARY - PROJECT PUMPS

Existing SMD #2 STEP System (31 EDU) plus Project (single pump on) - See Exhibit 3													
		Pump Curve Data											
Pump Label	**Pump Elevation** (ft)	**Shutoff Head** (ft)	**Shutoff Discharge** (gpm)	**Design Head** (ft)	**Design Discharge** (gpm)	**Maximum Operating Head** (ft)	**Maximum Operating Discharge** (gpm)	**Control Status**	**Intake Pump Grade** (ft)	**Discharge Pump Grade** (ft)	**Pump Discharge** (gpm)	**Pump Head** (ft)	**Calculated Water Power** (Hp)
C. Pump 1	474	110	0	81	40	61	60	Off	478	522.7	0	0	0
C. Pump 2	474	110	0	81	40	61	60	On	477.36	529.06	68.64	51.69	0.9

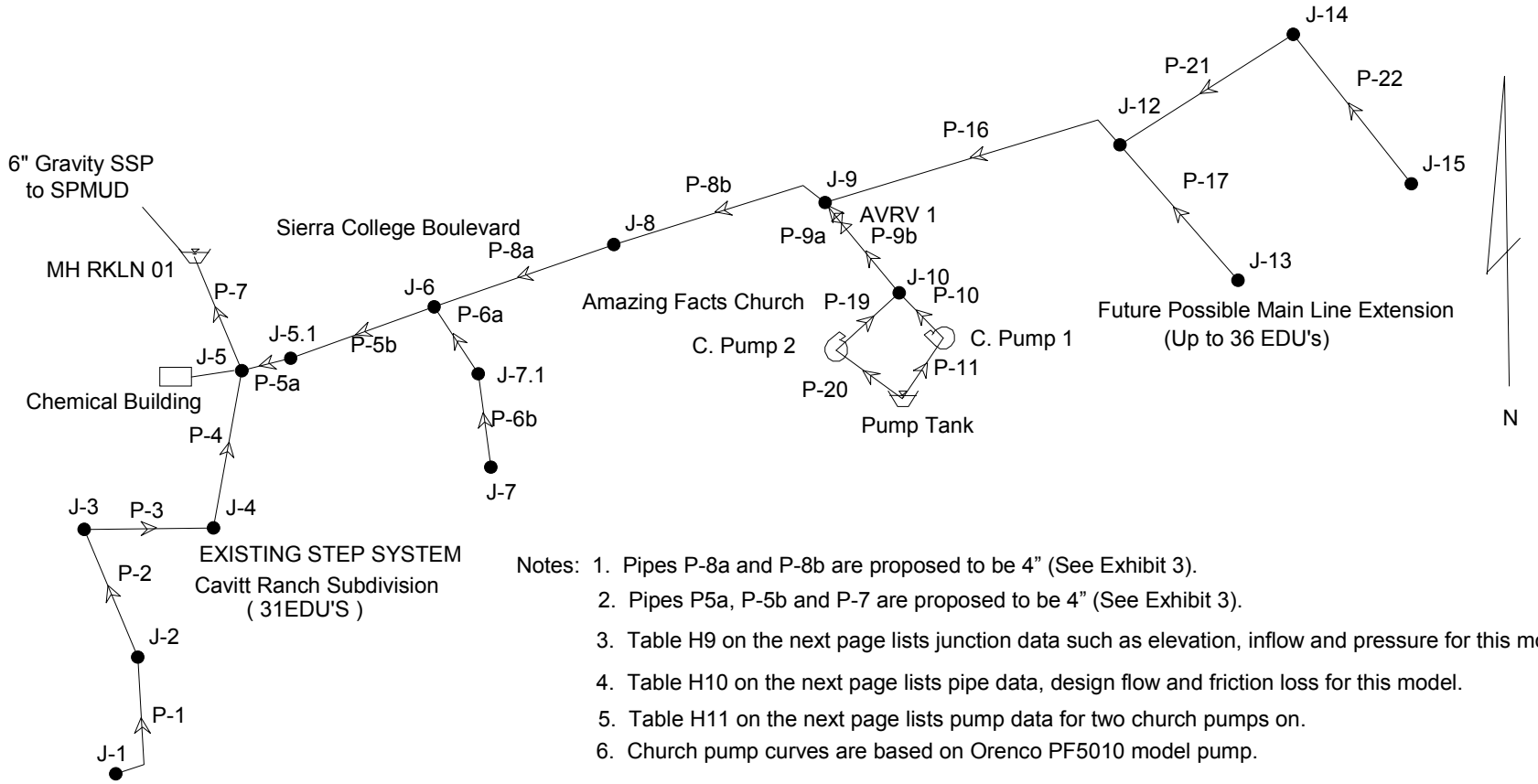
Existing SMD #2 STEP System (31 EDU) plus Project (two pumps on) - See Exhibit 3													
C. Pump 1	474	110	0	81	40	61	60	On	477.57	543.05	55.72	65.48	0.92
C. Pump 2	474	110	0	81	40	61	60	On	477.57	543.05	55.72	65.48	0.92
										Total Discharge =	111.44		

EXHIBIT 4

SMD #2 STEP SYSTEM - CAVITT RANCH, AMAZING FACTS CHURCH AND ULTIMATE SERVICE AREA

HYDRAULIC MODEL SCHEMATIC LAYOUT

April 4, 2011



Notes:
1. Pipes P-8a and P-8b are proposed to be 4” (See Exhibit 3).
2. Pipes P5a, P-5b and P-7 are proposed to be 4” (See Exhibit 3).
3. Table H9 on the next page lists junction data such as elevation, inflow and pressure for this model.
4. Table H10 on the next page lists pipe data, design flow and friction loss for this model.
5. Table H11 on the next page lists pump data for two church pumps on.
6. Church pump curves are based on Orenco PF5010 model pump.

TABLE H9
EXISTING STEP SYSTEM PLUS PROJECT- ALL PHASES PLUS ULTIMATE
HYDRAULIC SUMMARY - JUNCTIONS

See Exhibit 4

For Convenient Comparison Purposes, the Existing STEP System Junction Summary Data is copied into this Table.

Junct Label	Junction Elevation (ft)	No. of EDU's @ junct	Type of Flow at Junction	Junction Inflow (gpm)	Hydraulic Grade at Junction (ft)	Pressure at Junct (psi)	Remarks
Existing STEP System Design (31 EDU)							
J-1	261		Inflow	No calc	505.6	105.91	
J-2	407.8		Inflow	No calc	486.1	33.9	
J-3	440.9		Inflow	No calc	488.7	20.7	
J-4	437		Inflow	No calc	531.2	40.79	
J-5	466.6		Inflow	No calc	478.23	5.04	
J-5.1	468		Inflow	No calc	468	0	gravity flow shown in pipes P-5a, P-5b and P-6a
J-6	490.8		Inflow	No calc	491	0	gravity flow shown in pipes P-5a, P-5b and P-6a
J-7	463		Inflow	No calc	519.6	24.5	
J-7.1	495		Inflow	No calc	496.5	0.6	gravity flow shown in pipes P-5a, P-5b and P-6a
Existing SMD #2 STEP System (31 EDU) plus Project plus Ultimate Services (36 EDU) (two project pumps on)							
The Design Flows in the Existing Cavitt Ranch STEP system have been changed based on a Rational Design for this model							
J-1	261	9	Inflow	30	510.33	107.87	
J-2	407.8	0	Inflow	0	496.24	38.26	
J-3	440.9	1	Inflow	10	491.23	21.77	
J-4	437	8	Inflow	20	488.81	22.42	
J-5	466.6	0	Inflow	-45	471.52	2.13	Where two branches join, flow may be subtracted from system to account for probablistic model for the number of pumps on simultaneously
J-5.1	468	0	Demand	0	474.08	2.63	
J-6	490.8	0	Inflow	-30	507.49	7.22	Where two branches join, flow may be subtracted from system to account for probablistic model for the number of pumps on simultaneously
J-7	463	9	Inflow	30	519.02	24.24	
J-7.1	495	4	Inflow	30	515.59	8.91	
J-8	506	0	Demand	0	524.93	8.19	
J-9	515	0	Demand	0	537.41	9.7	
J-10	479	0	Demand	0	549.71	30.59	
J-12	536	7	Inflow	-10	561.73	11.13	Where two branches join, flow may be subtracted from system to account for probablistic model for the number of pumps on simultaneously
J-13	305	9	Inflow	30	593.68	124.9	
J-14	350	9	Inflow	10	574.73	97.23	
J-15	325	9	Inflow	30	592.04	115.54	

TABLE H10

EXISTING STEP SYSTEM + PROJECT- ALL PHASES + ULTIMATE HYDRAULIC SUMMARY - PIPES

See Exhibit 4 for Schematic Pipe Layout

For Convenient Comparison Purposes, the Existing STEP System Pipe Summary Data is copied into this Table

Pipe Label	Pipe Length (ft)	Pipe Diameter (in)	Pipe Material	Hazen-Williams C	Velocity (ft/s)	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
Existing SMD #2 STEP System Design (31 EDU)											
P-1	1,408.00	2.5	PVC	130	2.64	Open	40	505.6	486.1	19.5	13.9
P-2	1,450.00	3	PVC	130	2.65	Open	60	486.1	488.7	-2.6	11.3
P-3	410	3	PVC	130	2.65	Open	60	488.7	531.2	-42.5	11.3
P-4	1,386.00	3	PVC	130	5.5	Open	120	531.2	478.23	52.97	43.6
P-5a	100.00	3	PVC	130	4.07	Open	90	468	478.23	gravity flow	25
P-5b	1,302.00	3	PVC	130	4.07	Open	90	491	478.23	gravity flow	25
P-6a	590	3	PVC	130	4.07	Open	90	496.5	491	gravity flow	25
P-6b	900.00	3	PVC	130	4.07	Open	90	519.6	496.5	23.1	25
P-7	108.00	3	PVC	130	5.5	Open	120	478.23	467.15	11.08	43.6
Existing SMD #2 STEP System (31 EDU) plus Project plus Utimate Services (36 EDU) (2 pumps on)											
The Design Flows in the Existing Cavitt Ranch STEP system have been changed based on a Rational Design for this model											
P-1	1,408.00	2.46	PVC	120	2.03	Open	30	510.33	496.24	14.09	10.01
P-2	1,450.00	3.06	PVC	120	1.31	Open	30	496.24	491.23	5.01	3.46
P-3	410	3.06	PVC	120	1.75	Open	40	491.23	488.81	2.41	5.89
P-4	1,386.00	3.06	PVC	120	2.62	Open	60	488.81	471.52	17.3	12.48
P-5a	100	4.02	PVC	120	4.59	Open	181.49	474.08	471.52	2.57	25.66
P-5b	1,302.00	4.02	PVC	120	4.59	Open	181.49	507.49	474.08	33.4	25.66
P-6a	590	3	PVC	120	2.72	Open	60	515.59	507.49	8.11	13.74
P-6b	900	3	PVC	120	1.36	Open	30	519.02	515.59	3.43	3.81
P-7	108	3.82	PVC	120	5.5	Open	196.49	471.52	467.4	4.12	38.11
P-8a	950	4.02	PVC	120	3.83	Open	151.49	524.93	507.49	17.44	18.36
P-8b	680	4.02	PVC	120	3.83	Open	151.49	537.41	524.93	12.48	18.36
P-9a	1	3.06	PVC	120	3.99	Open	91.49	537.44	537.41	0.03	27.28
P-9b	450	3.06	PVC	120	3.99	Open	91.49	549.71	537.44	12.27	27.26
P-10	50	2	PVC	120	4.67	Open	45.75	552.7	549.71	3	59.93
P-11	5	2	PVC	120	4.67	Open	45.75	477.5	477.2	0.3	59.92
P-16	1,500.00	2.9	PVC	120	2.91	Open	60	561.73	537.41	24.31	16.21
P-17	2,400.00	2.32	PVC	120	2.28	Open	30	593.68	561.73	31.95	13.31
P-19	50	2	PVC	120	4.67	Open	45.75	552.7	549.71	3	59.93
P-20	5	2	PVC	120	4.67	Open	45.75	477.5	477.2	0.3	59.92
P-21	1,700.00	2.9	PVC	120	1.94	Open	40	574.73	561.73	13	7.65
P-22	1,300.00	2.32	PVC	120	2.28	Open	30	592.04	574.73	17.31	13.31

TABLE H11

EXISTING STEP SYSTEM PLUS PROJECT - ALL PHASES PLUS ULTIMATE HYDRAULIC SUMMARY - PROJECT PUMPS

Existing SMD #2 STEP System (31 EDU) plus Project Plus Ultimate Services (36 EDU) (two pumps on) - See Exhibit 4

		Pump Curve Data											
Pump Label	**Pump Elevation** (ft)	**Shutoff Head** (ft)	**Shutoff Discharge** (gpm)	**Design Head** (ft)	**Design Discharge** (gpm)	**Maximum Operating Head** (ft)	**Maximum Operating Discharge** (gpm)	**Control Status**	**Intake Pump Grade** (ft)	**Discharge Pump Grade** (ft)	**Pump Discharge** (gpm)	**Pump Head** (ft)	**Calculated Water Power** (Hp)
C. Pump 1	474	110	0	81	40	61	60	On	477.2	552.7	45.75	75.5	0.87
C. Pump 2	474	110	0	81	40	61	60	On	477.2	552.7	45.75	75.5	0.87
										Total Discharge =	91.5		

FIGURES

FIGURE 1-PROJECT (PHASE I) PEAK SEWER FLOW DESIGN SCENARIO (GRAPH)

FIGURE 2-PROJECT (ALL PHASES) PEAK SEWER FLOW DESIGN SCENARIO (GRAPH)

FIGURE 3- PROJECT SEWER PUMP STATION PROFILE AND DETAILS

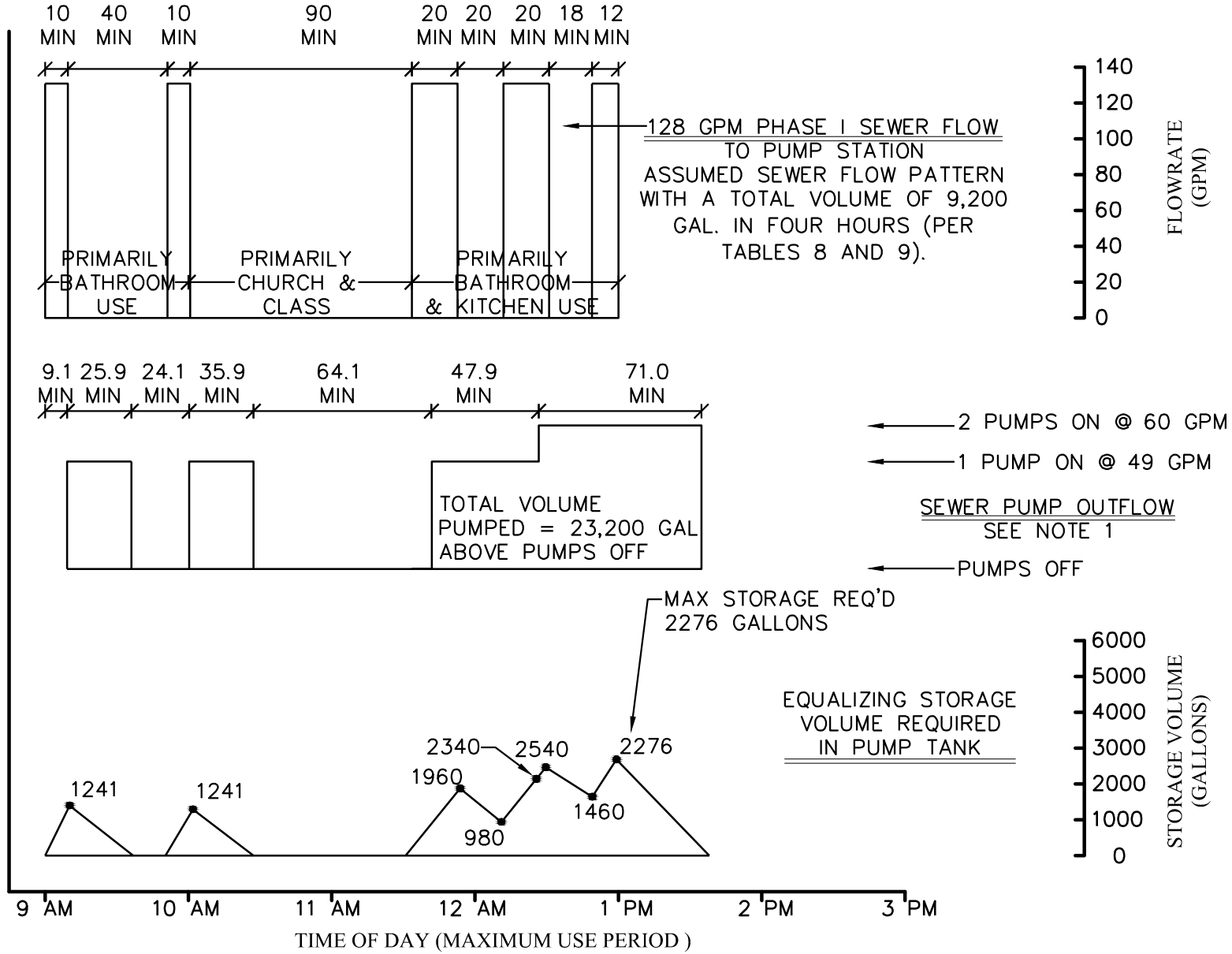
HYDRAULIC GRADE PROFILES

FIGURE 4- EXISTING STEP SYSTEM (31 EDU)

FIGURE 5- EXIST. (31 EDU) + PROJECT (PHASE I)

FIGURE 6- EXIST. (31 EDU) + PROJECT (ALL PHASES)

FIGURE 7- EXIST. (31 EDU) + PROJECT (ALL PHASES) + ULTIMATE (36 EDU)

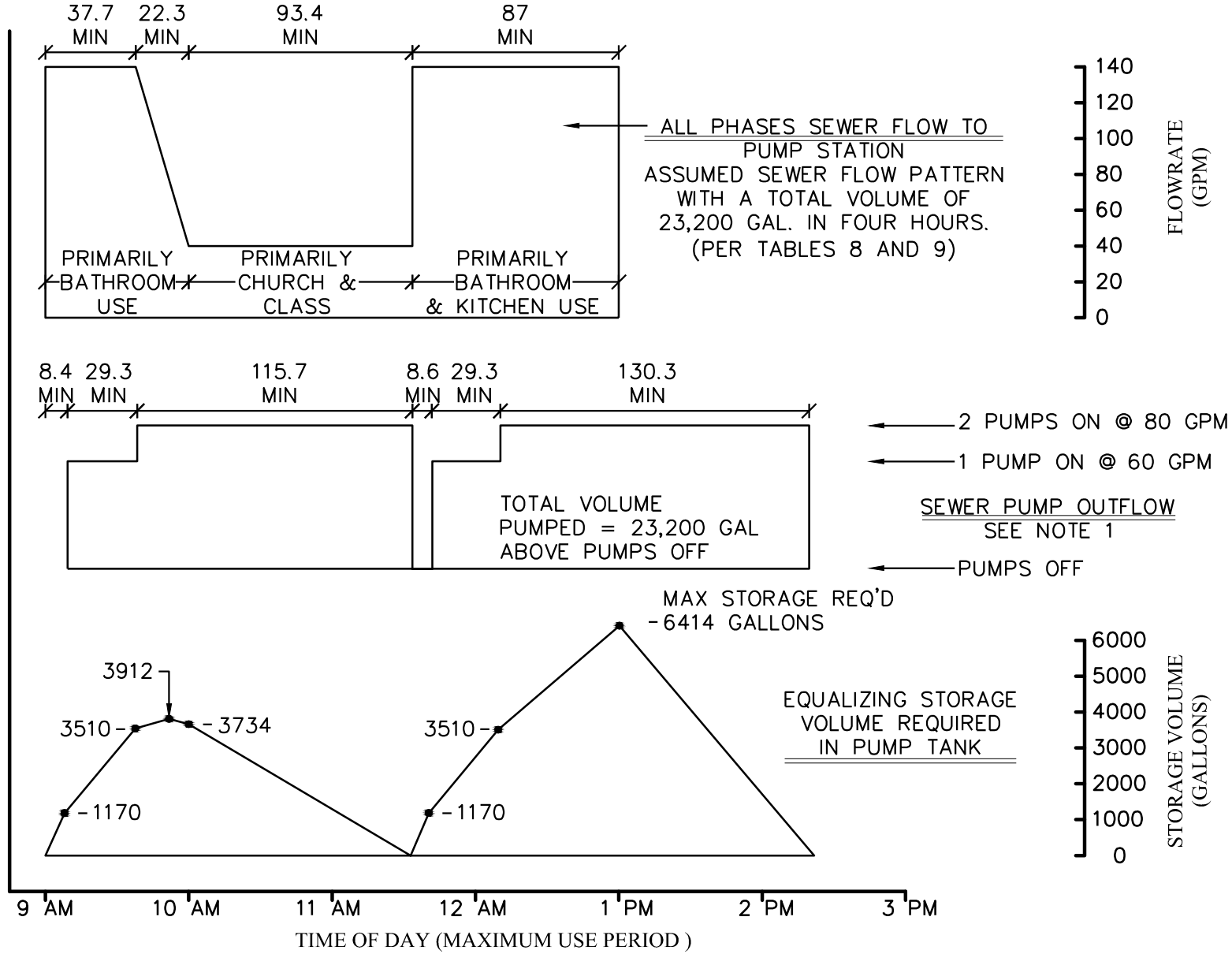


NOTES: 1. SEWER PUMP FLOWRATE IS CALCULATED CONSERVATIVELY FOR SIMULTANEOUS PEAK DESIGN RESIDENTIAL STEP PUMP FLOW. OVER THIS 5 HOUR PERIOD, ACTUAL RESIDENTIAL FLOWRATES WILL USUALLY BE LESS THAN PEAK, SO CHURCH PUMPS ARE EXPECTED TO ACTUALLY PUMP MORE THAN SHOWN ABOVE.

FIGURE 1

AMAZING FACTS PROJECT (PHASE I) PEAK SEWER FLOW DESIGN SCENARIO BASED ON FOUR HOUR MAXIMUM USE PERIOD

H:\1PROJ\04-18-AMAZING\DWG\EXHIBITS\EXHIBIT-SEWER FIGS 1 - 3.DWG4/15/2011 12:01 PM

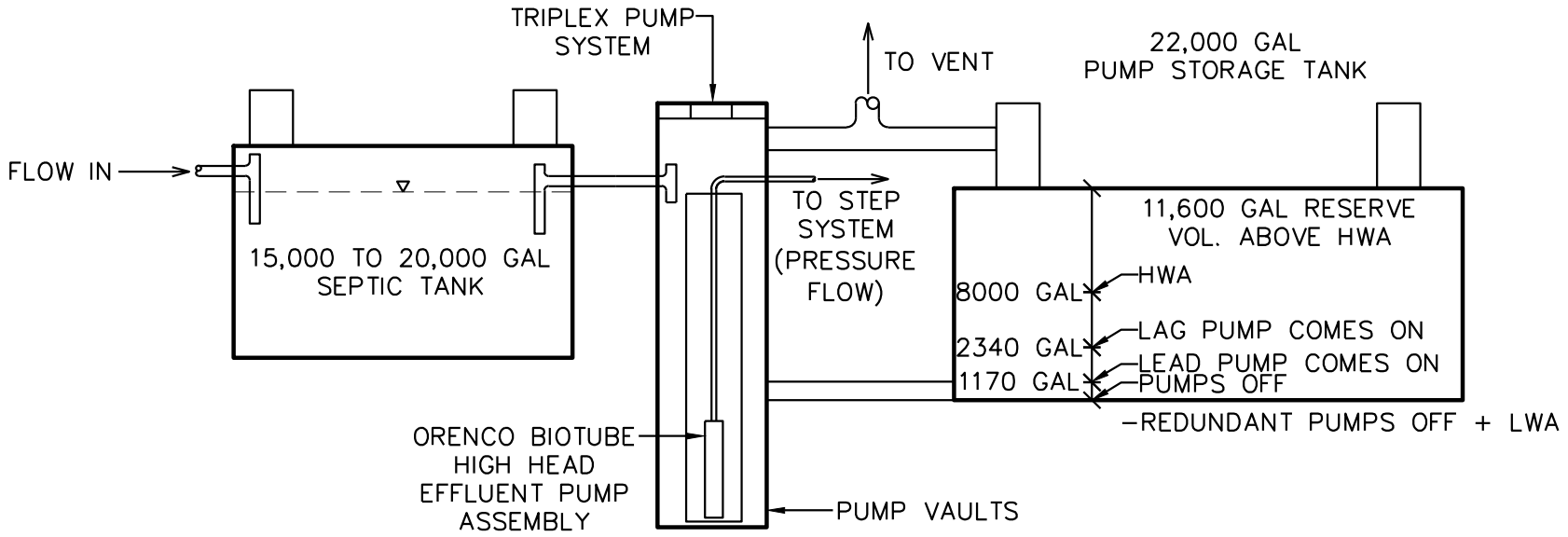


NOTES: 1. SEWER PUMP FLOWRATE IS CALCULATED CONSERVATIVELY FOR SIMULTANEOUS PEAK DESIGN RESIDENTIAL STEP PUMP FLOW. OVER THIS 5 HOUR PERIOD, ACTUAL RESIDENTIAL FLOWRATES WILL USUALLY BE LESS THAN PEAK, SO CHURCH PUMPS ARE EXPECTED TO ACTUALLY PUMP BETWEEN 60 GPM AND 110 GPM.

FIGURE 2

AMAZING FACTS PROJECT (ALL PHASES) PEAK SEWER FLOW DESIGN SCENARIO BASED ON FOUR HOUR MAXIMUM USE PERIOD

H:\1PROJ\04-18-AMAZING\DWG\EXHIBITS\EXHIBIT-SEWER FIGS 1 - 3.DWG4/15/2011 1:25 PM



LEGEND

HWA = HIGH WATER ALARM

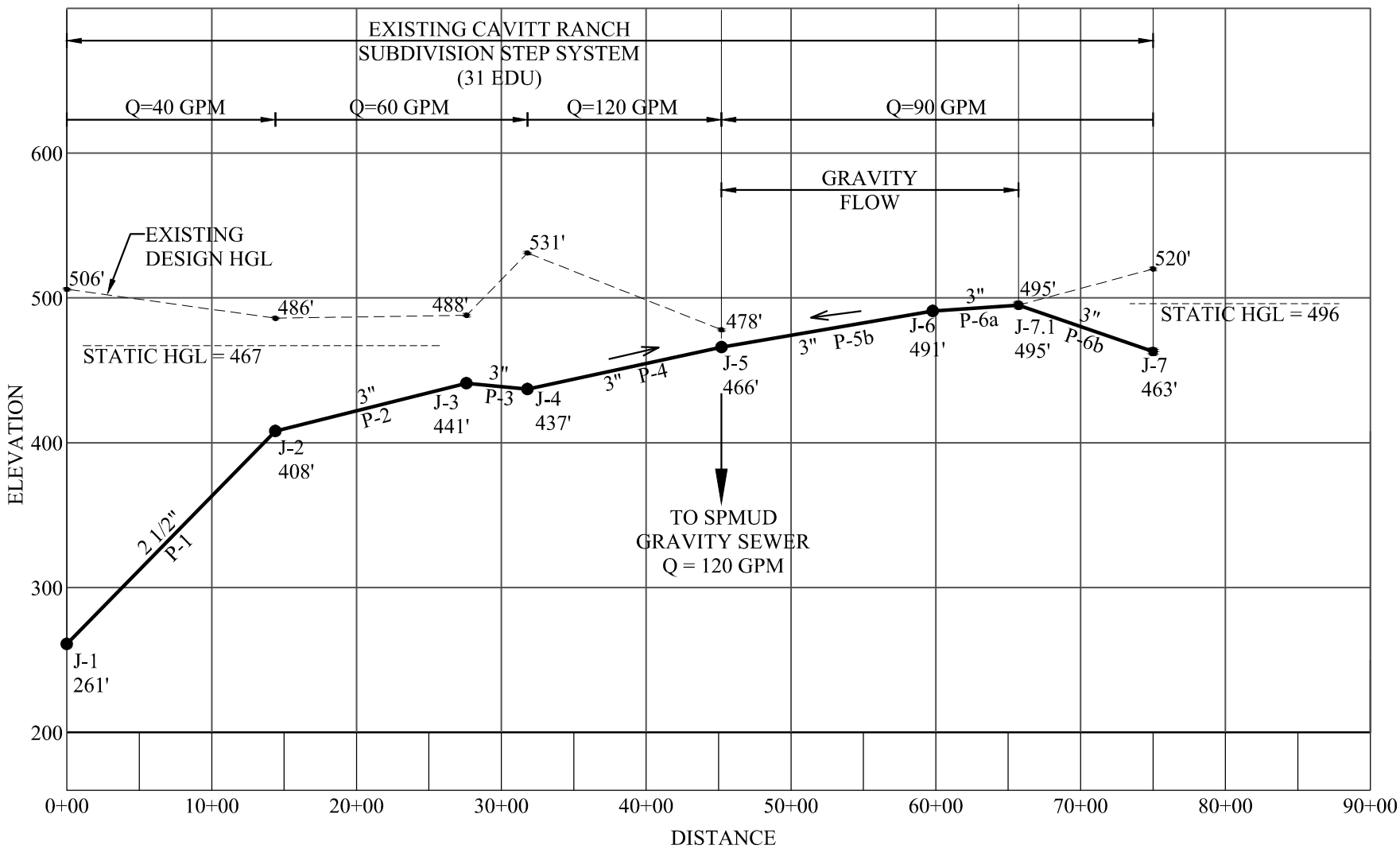
LWA = LOW WATER ALARM

NOTES: 1. FLOAT LEVELS ARE ADJUSTABLE.
2. TOTAL STORAGE IN STORAGE TANK AND PUMP VAULTS IS 23,200 GALLONS MINIMUM (ABOVE THE PUMPS OFF LEVEL).

FIGURE 3

AMAZING FACTS PROJECT (PHASE I AND ALL PHASES) SEWER PUMP STATION PROFILE

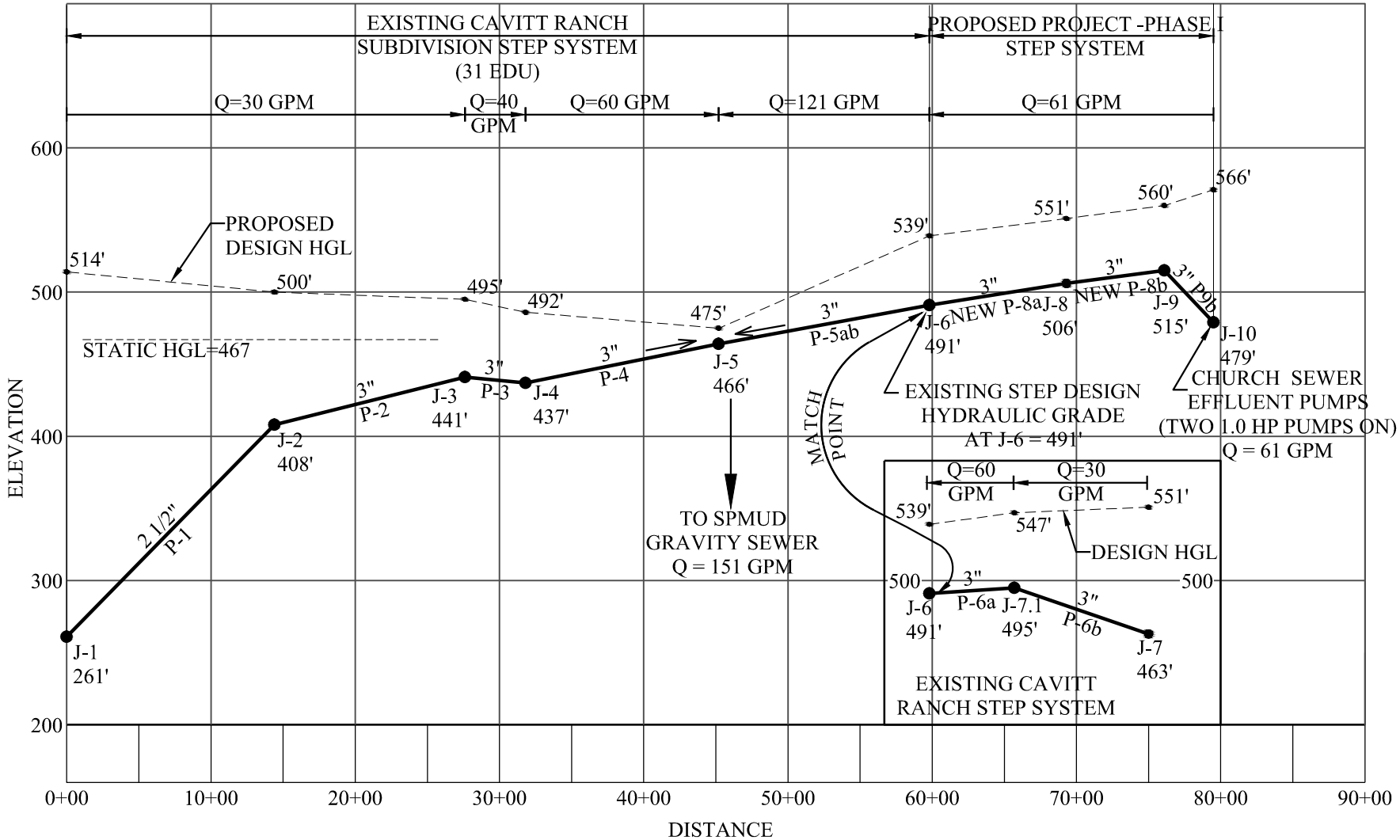
H:\1PROJ\04-18-AMAZING\DWG\EXHIBITS\EXHIBIT-SEWER FIGS 1 - 3.DWG4/15/2011 1:25 PM



SCALE:
1"=1000' HORIZONTAL
1"=100' VERTICAL

FIGURE 4
EXISTING STEP SYSTEM (31 EDU)
HYDRAULIC DESIGN BY MURRAY SMITH & ASSOCIATES
PLACER COUNTY SEWER MAINTENANCE DISTRICT #2 STEP
SEWER SYSTEM HYDRAULIC GRADE LINE AT DESIGN FLOW

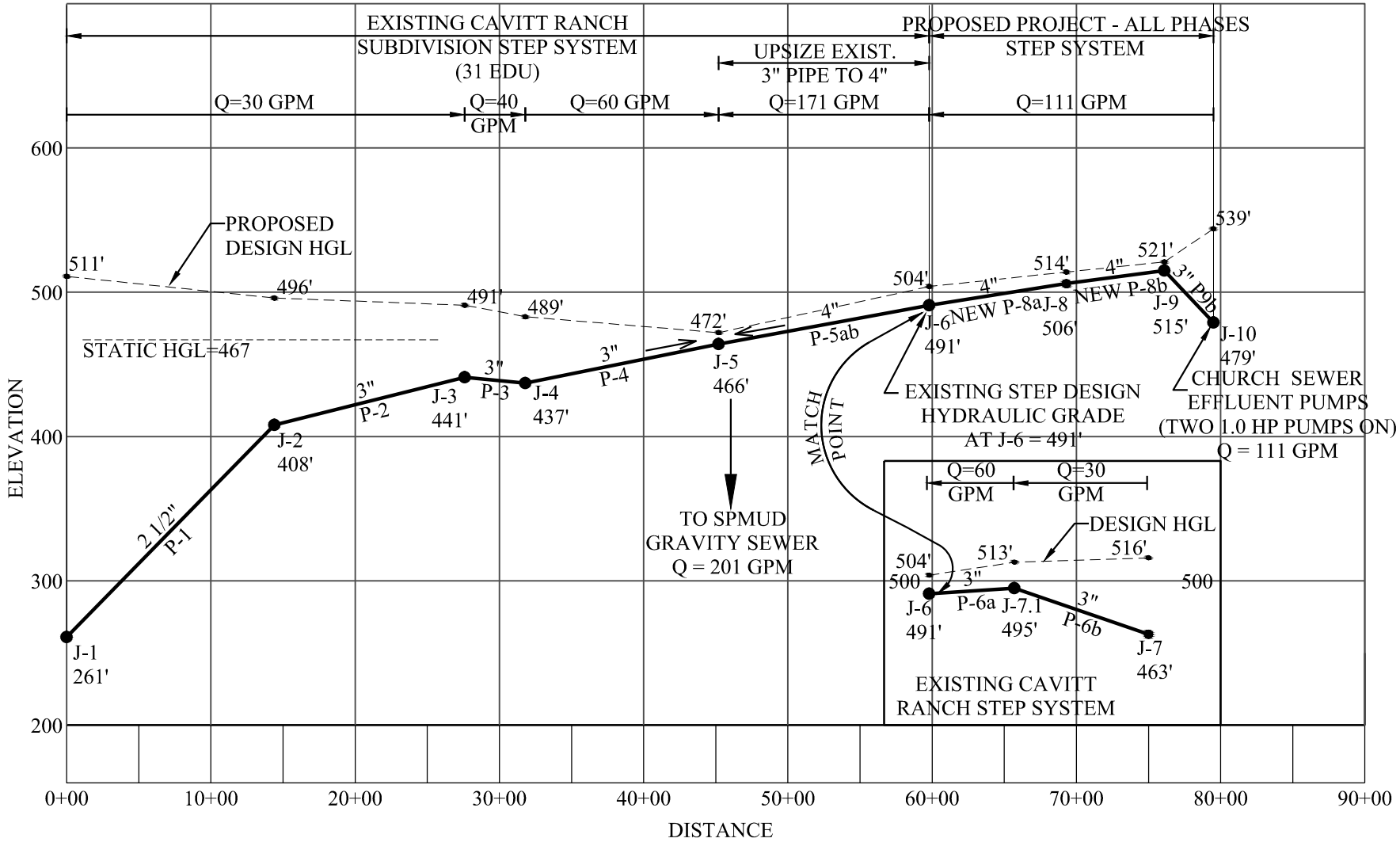
H:\1PROJ\04-18-AMAZING\DWG\EXHIBITS\EXHIBIT SEWER FIGS 4 - 7.DWG4/15/2011 1:39 PM



SCALE:
1"=1000' HORIZONTAL
1"=100' VERTICAL

FIGURE 5
EXISTING STEP SYSTEM (31 EDU) + PROJECT - PHASE 1
PLACER COUNTY SEWER MAINTENANCE DISTRICT #2 STEP
SEWER SYSTEM HYDRAULIC GRADE LINE AT DESIGN FLOW

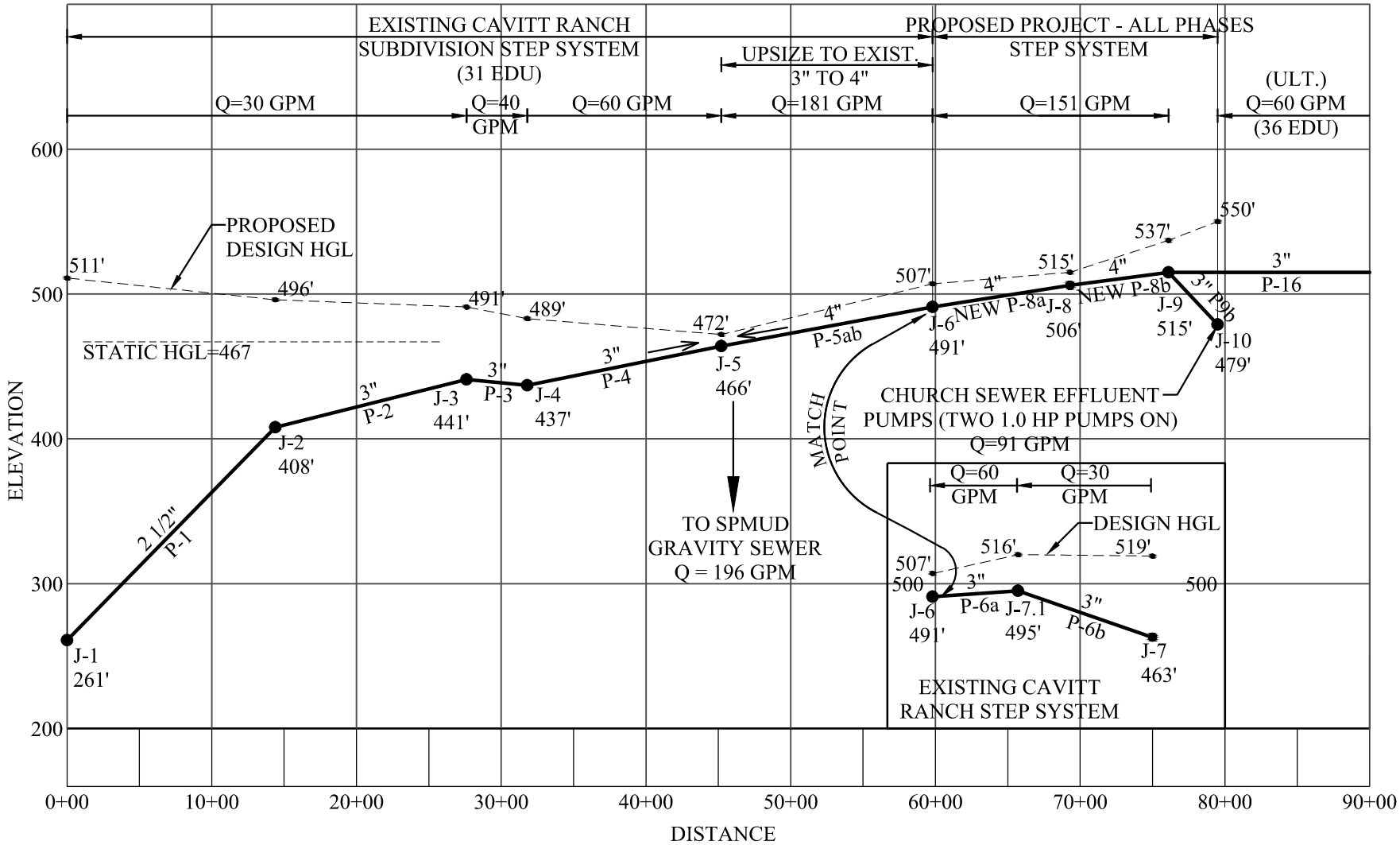
H:\1PROJ\04-18-AMAZING\DWG\EXHIBITS\EXHIBIT SEWER FIGS 4 - 7.DWG4/15/2011 1:38 PM



SCALE:
1"=1000' HORIZONTAL
1"=100' VERTICAL

FIGURE 6
EXISTING STEP SYSTEM (31 EDU) + PROJECT - ALL PHASES
PLACER COUNTY SEWER MAINTENANCE DISTRICT #2 STEP
SEWER SYSTEM HYDRAULIC GRADE LINE AT DESIGN FLOW

H:\1PROJ\04-18-AMAZING\DWG\EXHIBITS\EXHIBIT SEWER FIGS 4 - 7.DWG4/15/2011 1:38 PM



SCALE:
1"=1000' HORIZONTAL
1"=100' VERTICAL

FIGURE 7

EXISTING STEP SYSTEM (31 EDU) + PROJECT (ALL PHASES) + ULTIMATE (36 EDU)
PLACER COUNTY SEWER MAINTENANCE DISTRICT #2 STEP SEWER SYSTEM
HYDRAULIC GRADE LINE AT DESIGN FLOW

H:\1PROJ\04-18-AMAZING\DWG\EXHIBITS\EXHIBIT SEWER FIGS 4 - 7.DWG4/15/2011 1:36 PM

APPENDIX

1. Examples of Peak Design Flow Derivations for STEP sewer systems (as referenced in Table 4, Section 3 of this report)
    a) Environment/One Table 1 showing the maximum number of sewer pumps operating simultaneously, based on probabilistic model.
    b) Battelle Institute Design Flow graph for deriving peak design flow for STEP system
    c) Terry Bounds Equation adapted for this project's peak flow criteria.

2. Pump curves for Project pump station: Orenco Systems, Inc. PF 5010 high head effluent pump curve.
3. South Placer Municipal Utility District's letter of available sewer capacity

DESIGN FLOWS FROM ENVIRONMENT/ONE DESIGN GUIDELINES

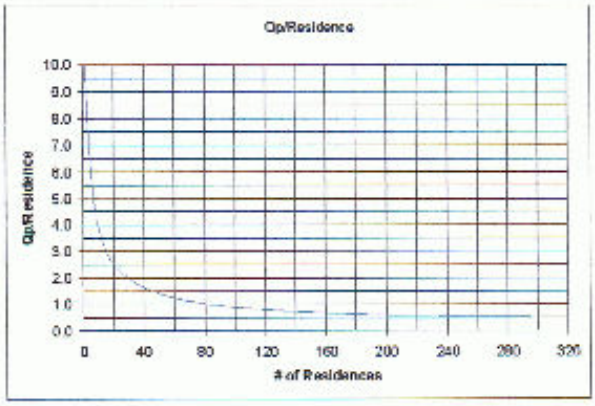
Table 1 Peak Ratios and Design Flows from Environment/One Design Guidelines

Number of Grinder Pumps or Houses Connected (*)	Midpoint of Range	Likely Maximum Number Operating Simultaneously (*)	Ratio	(Peak) Design Discharge Using 12 gpm pumps	Peak Flow/House (gpm)
1	1.0	1.00	1.00	12	12.00
2-3	2.5	2.00	0.80	24	9.60
4-9	6.5	3.00	0.46	36	5.54
10-18	14.0	4.00	0.29	48	3.43
19-30	24.5	5.00	0.20	60	2.45
31-50	40.5	6.00	0.15	72	1.78
51-80	65.5	7.00	0.11	84	1.28
81-113	97.0	8.00	0.08	96	0.99
114-146	130.0	9.00	0.07	108	0.83
147-179	163.0	10.00	0.06	120	0.74
180-212	196.0	11.00	0.06	132	0.67
213-245	229.0	12.00	0.05	144	0.63
246-278	262.0	13.00	0.05	156	0.60
279-311	295.0	14.00	0.05	168	0.57
312-344	328.0	15.00	0.05	180	0.55

* Environment/One Published Data

The dramatic increase in flow recommended by this design procedure becomes quite evident when the data is plotted. Figure 9 shows how the design flow per residence rises from about 0.5 gpm for more than 200 houses to in the range of 10 gpm for less than 10 houses.

Figure 9 Environment/One Design Flows/Residence



Effluent Sewer Pipe Selection w/ Battelle Flows

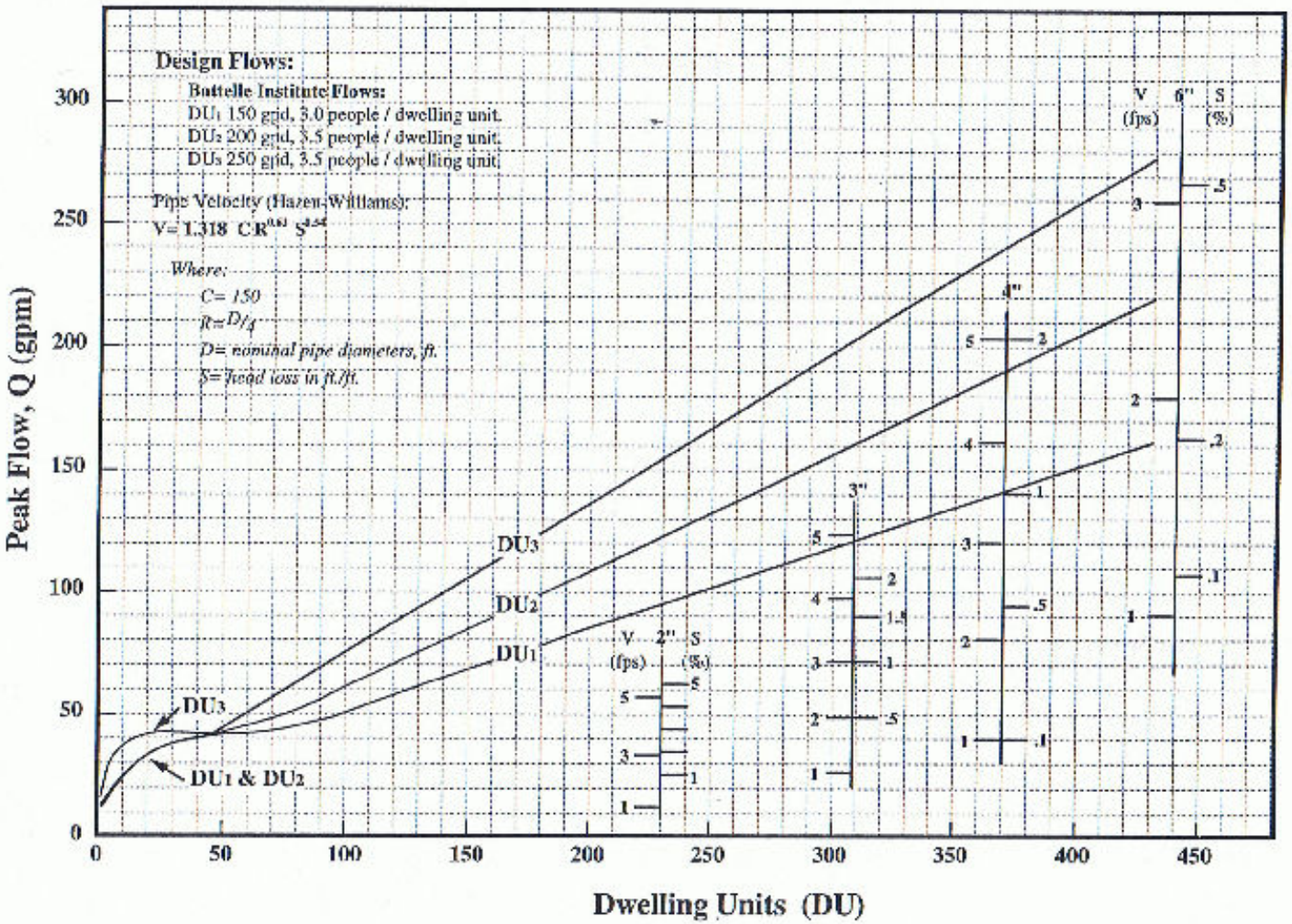


FIG. 1

DESIGN FLOW EQUATION FOR STEP SEWER SYSTEMS
(Bounds, Ref.1)

$Q_p = (DU)\ Q_{ADWF}\ (PF)/1440 + D$

Where:

Q_p = total design peak flow in gpm for STEP system
DU = number of dwelling units
Q_{ADWF} = average day dry weather unit flow factor of 2x190 gpd per DU (Ref. 5, TM 3a)
(PF) = peaking factor equal to 3.6 for STEP system services (Ref. 5, TM 3a)
D = Base pump flow: use 20 gpm for STEP system residential services plus the peak flow from this project's sewer pumps.

Example: Design flow for 31 EDU's

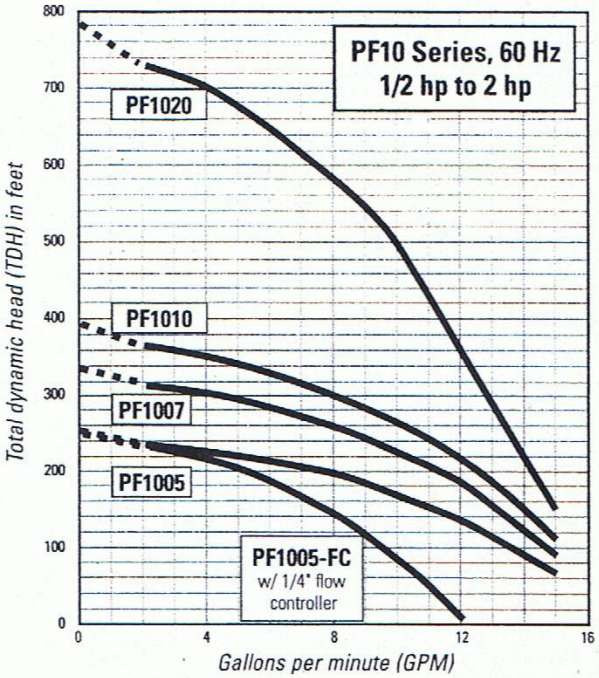
$Q_p = 31(380x3.6)/1440 + 20 = 50$ gpm

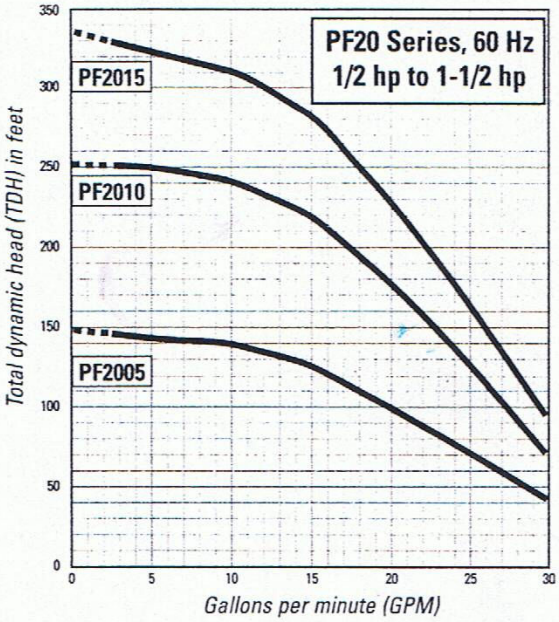
PF Series High-Head Effluent Pumps (continued)

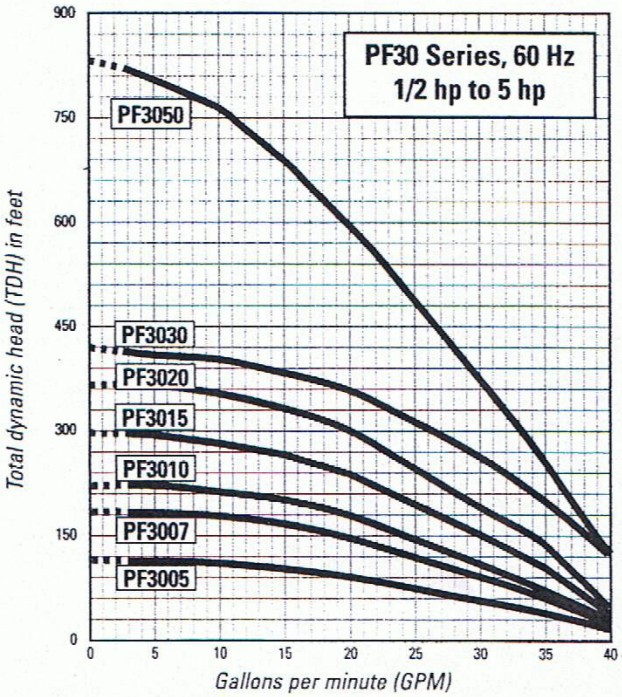
Using a Pump Curve

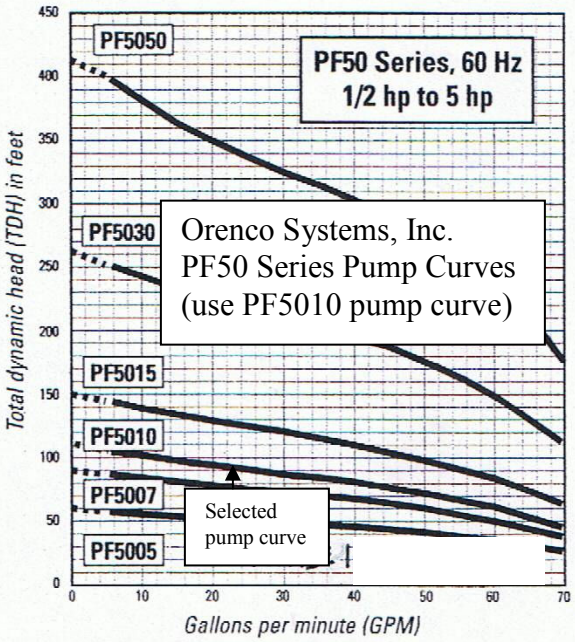
A *pump curve* helps you determine the best pump for your system. Pump curves show the relationship between flow (gpm or L/sec) and pressure (total dynamic head, or TDH), providing a graphical representation of a pump's optimal performance range. Pumps perform best at their *nominal flow rate* — the value, measured in gpm (or L/sec), expressed by the first two numerals in an Orenco pump nomenclature. At low flow rates, TDH varies from pump to pump, so it is represented as a dashed line in the pump curves. For most accurate pump specification, use Orenco's PumpSelect™ software.

60 Hz Models









© 2008 Orenco Systems® Inc.

SOUTH PLACER
MUNICIPAL UTILITY DISTRICT

RECEIVED
JUL 0 9 2009
KING ENGINEERING

July 7, 2009

King Engineering, Inc.
563 Brunswick Rd
Suite 11
Grass Valley CA 95945

Attention: Mr. George Hansen

Subject: Amazing Facts Church
Sierra College Blvd.
SPMUD Sewer Capacity

Dear George:

Regarding your letter dated June 11, 2009 and the Step Sewer System Design Report, please be advised that the SPMUD Sewer Collections System has adequate capacity to accommodate the 201 gpm peak flow from this area (existing Cavitt Ranch Estates, proposed Amazing Facts Church, and potential 34 future EDU') s.

As a reminder, upon completion of the County's Annexation of the area into its SMD2, the existing SPMUD/County Agreement will need to be amended. Also, SPMUD will need to review and approve that aspect of the improvement plan related to the modification of the connection to Manhole RKLN01.

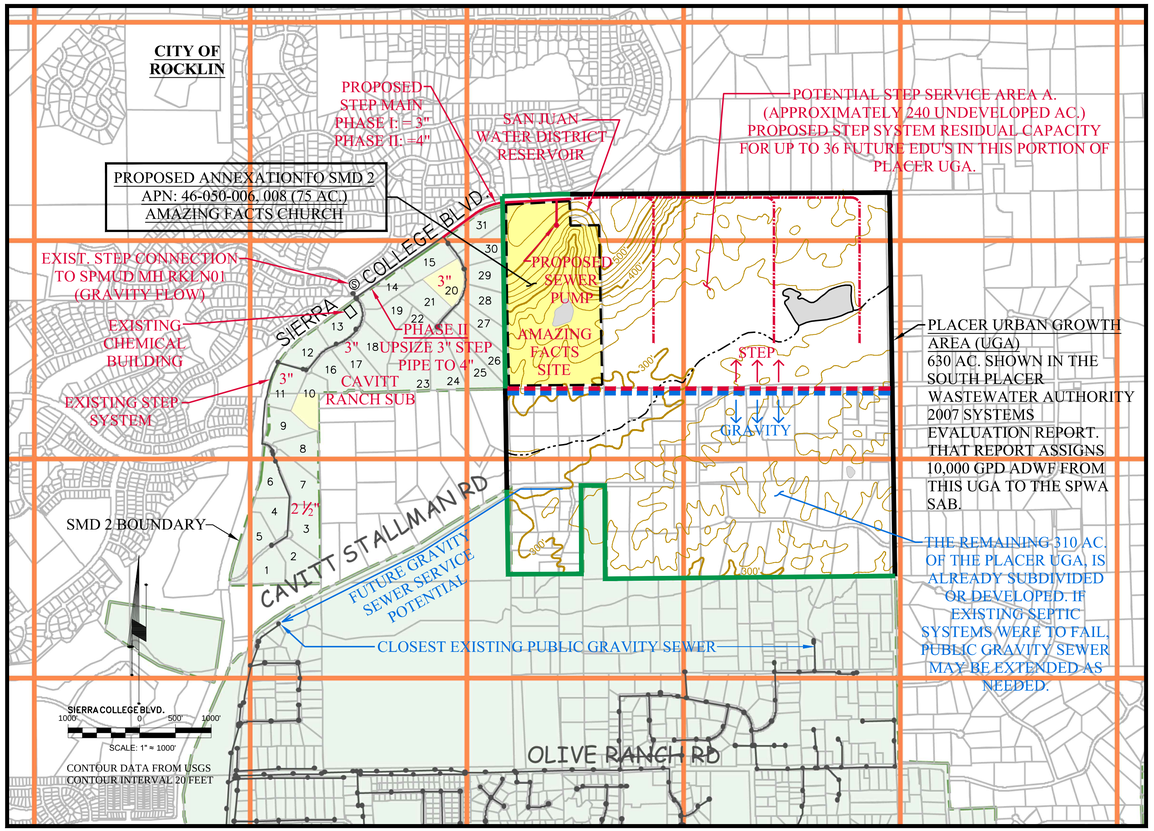
If there are any questions or a need for more information, please don't hesitate to call.

Sincerely,

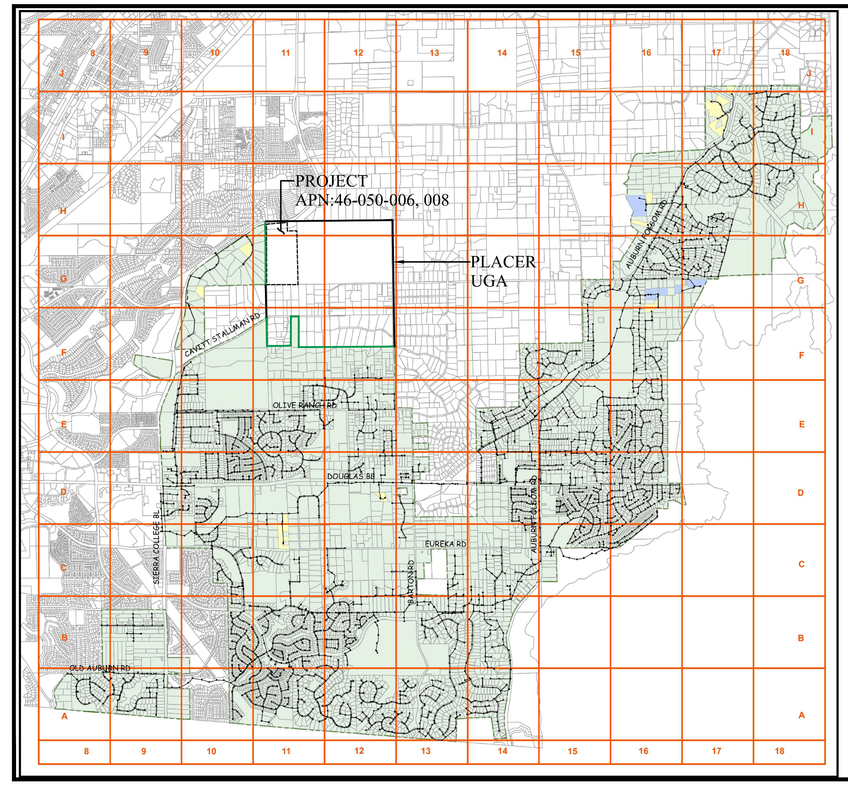
Richard Stein
Engineering Manager

RS/jag

5807 SPRINGVIEW DRIVE • ROCKLIN, CALIFORNIA 95677 • PHONE (916) 786-8555 • FAX (916) 786-8553



PLACER URBAN GROWTH AREA (UGA) CONCEPT SEWER SERVICE PLAN (PROGRAM LEVEL)



MAP INDEX

SMD 2

SEWER MAINTENANCE DISTRICT 2
SANITARY SEWER

LEGEND
DISTRICT BOUNDARY
STEPS
PLACER COUNTY MAINTAINED
PRIVATE SYSTEMS

THIS MAP IS FOR INFORMATION ONLY AND IS NOT TO BE USED FOR DESIGN PURPOSES. PLACER COUNTY DOES NOT GUARANTEE ACCURACY OR CURRENTNESS OF THE INFORMATION. PERMITS ARE REQUIRED FOR EXCAVATION IN COUNTY RIGHTS OF WAY OR PUBLIC UTILITY EASEMENTS.

REV: 06/01/06

NOT TO SCALE

PLACER COUNTY

FACILITY SERVICES

PROPOSED ANNEXATION PROJECT SEWER DATA:

	PROJECT SEWER DATA:	PHASE 1	PHASE 2	TOTAL
1.	BUILDING AREA	107,220 SF	89,810 SF	197,030 SF
2.	AVERAGE DAY DRY WEATHER FLOW (ADWF)	2,090 TO 4,517 GPD (ADWF)	950 TO 2,214 GPD (ADWF)	3,040 TO 6,978 GPD (ADWF)
3.	PROPOSED MINIMUM DESIGN PUMP FLOW FOR AMAZING FACTS MINISTRY(GPM)	49 GPM (ONE PUMP ON) 61 GPM (TWO PUMPS ON)	91 GPM (TWO PUMPS ON)	91 GPM (TWO PUMPS ON)

GLOSSARY

ADWF	AVERAGE DRY WEATHER FLOW (DEFINED AS 190 GPD PER DU IN THE 2007 SPWA REPORT)
DU or EDU	DWELLING UNIT (SPWA DEFINITION) OR EQUIVALENT DWELLING UNIT (PLACER COUNTY DEFINITION) 1 RESIDENCE = 1 DU OR 1 EDU
GPD	GALLONS PER DAY
SAB	SERVICE AREA BOUNDARY (FOR THE SPWA SYSTEM)
SMD 2	PLACER COUNTY SEWER MAINTENANCE DISTRICT NO. 2
SPMUD	SOUTH PLACER MUNICIPAL UTILITY DISTRICT
SPWA	SOUTH PLACER WASTEWATER AUTHORITY
STEP	SEPTIC TANK EFFLUENT PUMPED SEWER
UGA	URBAN GROWTH AREA (SHOWN IN THE SPWA 2007 SYSTEMS EVALUATION REPORT)

PLACER COUNTY SEWER MAINTENANCE DISTRICT NO.2

SERVICE AREA MAP

FOR

PROPOSED ANNEXATION TO SMD 2 AND EXPANDED SERVICE AREA BOUNDARY FOR THE SPWA SYSTEM
Placer County, California

APRIL 4, 2011

AMAZING FACTS MINISTRY

PLACER COUNTY, CALIFORNIA

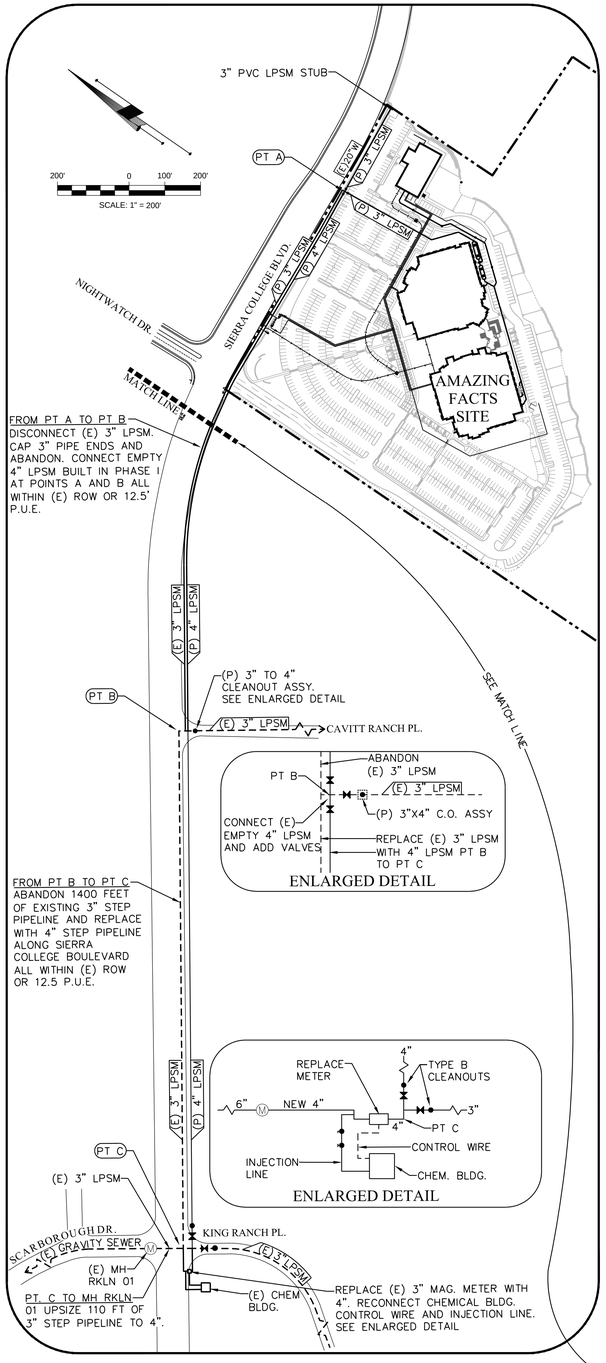
OWNER & APPLICANT:
AMAZING FACTS, INC.
1203 W SUNSET BLVD.
ROSEVILLE, CA 95765-1305
916-434-3880

PLACER COUNTY FACILITIES SERVICES
11476 C AVE
AUBURN, CA 95603
(530)-886-4900

ENGINEER :
KING ENGINEERING INC.
PLANNING ENGINEERING CONST. SUPPORT
563 Brunswick Road, Suite 11
Grass Valley, California 95945
(530)272-8328 FAX:(530)272-6039

© KING ENGINEERING INC. DRAWINGS AND DIGITAL DRAWING FILES ARE NEITHER FINAL NOR ARE THEY TO BE USED FOR FINAL DESIGN OR CONSTRUCTION UNTIL THEY ARE TRANSFORMED INTO HARD COPY AND SIGNED BY THE ENGINEER. ALL DRAWINGS AND DATA CONTAINED WITHIN THIS FILE ARE THE PROPRIETARY PROPERTY OF KING ENGINEERING, INC. NO UNAUTHORIZED USE, REUSE, OR DUPLICATION OF THESE DRAWINGS AND/OR DATA IS PERMITTED WITHOUT THE EXPRESS WRITTEN CONSENT OF KING ENGINEERING, INC.

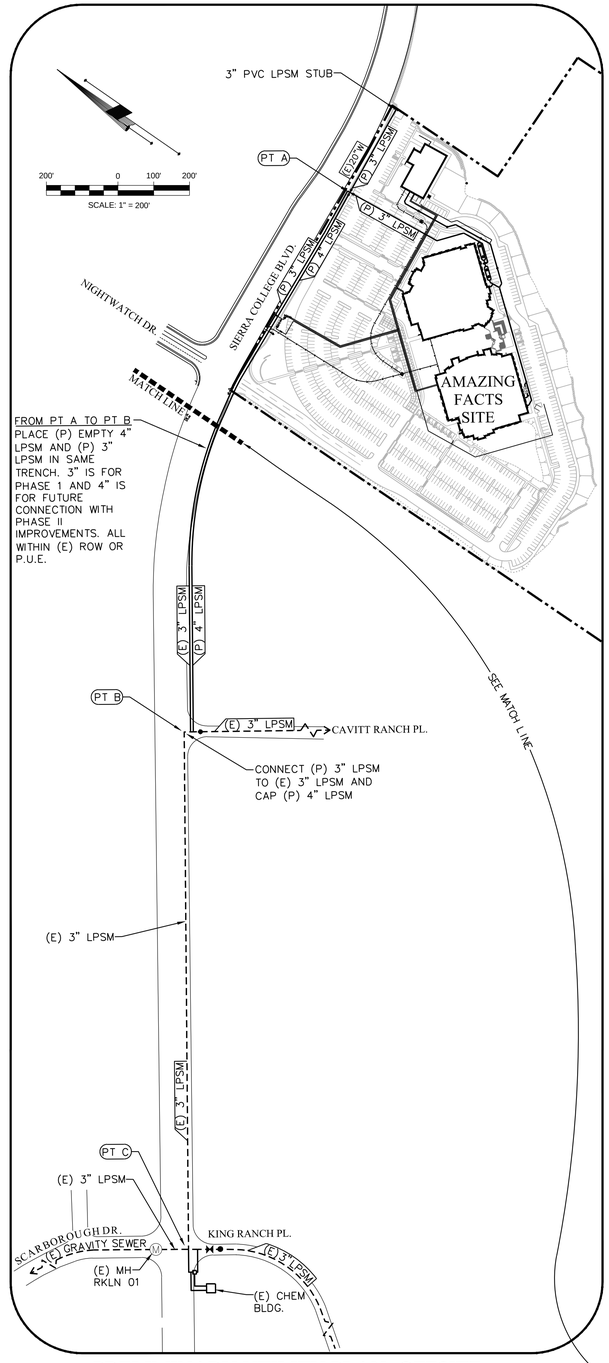
H:\1PROJ\04-18-AMAZING\DWG\P-SEWER MAP.DWG 4/19/2011 2:43 PM



PRELIMINARY UTILITY PLAN- OFFSITE
(PHASE II + ULTIMATE)

NOTE: THESE OFFSITE IMPROVEMENTS ARE TO BE DONE BY AMAZING FACTS PHASE II OR BY A FUTURE DEVELOPMENT (UP TO 36 EDU'S) WHICHEVER OCCURS FIRST.

SOURCE: KING ENGINEERING INC., 2011



PRELIMINARY UTILITY PLAN -OFFSITE
(PHASE I)

WATER DATA

-FIRE FLOW=2,250 GPM FOR 4 HOUR DURATION OR AS DETERMINED BY FIRE MARSHAL

-MAX PIPELINE VELOCITY UP TO DCDA=7 FPS

-SPRINKLERED BUILDINGS

-FIRE HYDRANTS AND BLDG. SPRINKLERS ARE SHOWN ON PRIVATE WATERLINES.

-PUBLIC WATER PROVIDER:
PCWA

144 FERGUSON RD.
AUBURN, CA 95604
530-823-4850

CHURCH PUMP DATA
THE PUMP STATION IS DESIGNED TO BE A TRIPLEX PUMP ASSEMBLY. UP TO TWO PUMPS WILL PUMP SIMULTANEOUSLY WITH THE REMAINING PUMP ON STANDBY, PUMPS WILL ALTERNATE IN OPERATION SEQUENCE.

PHASE I
MIN. DESIGN FLOW - 1 PUMP ON = 49 GPM
MIN. DESIGN FLOW - 2 PUMPS ON = 61 GPM

PHASE II
MIN. DESIGN FLOW - 2 PUMPS ON = 91 GPM

SEWER DATA

SEWER FLOW DATA	PHASE 1	ALL PHASES
-MAX DAY DESIGN FLOW=	9,200 GAL	23,200 GAL
-AVG DAY DRY WEATHER FLOW (ADWF)=	2,090 TO 4,517 GPD	3,040 TO 6,978 GPD

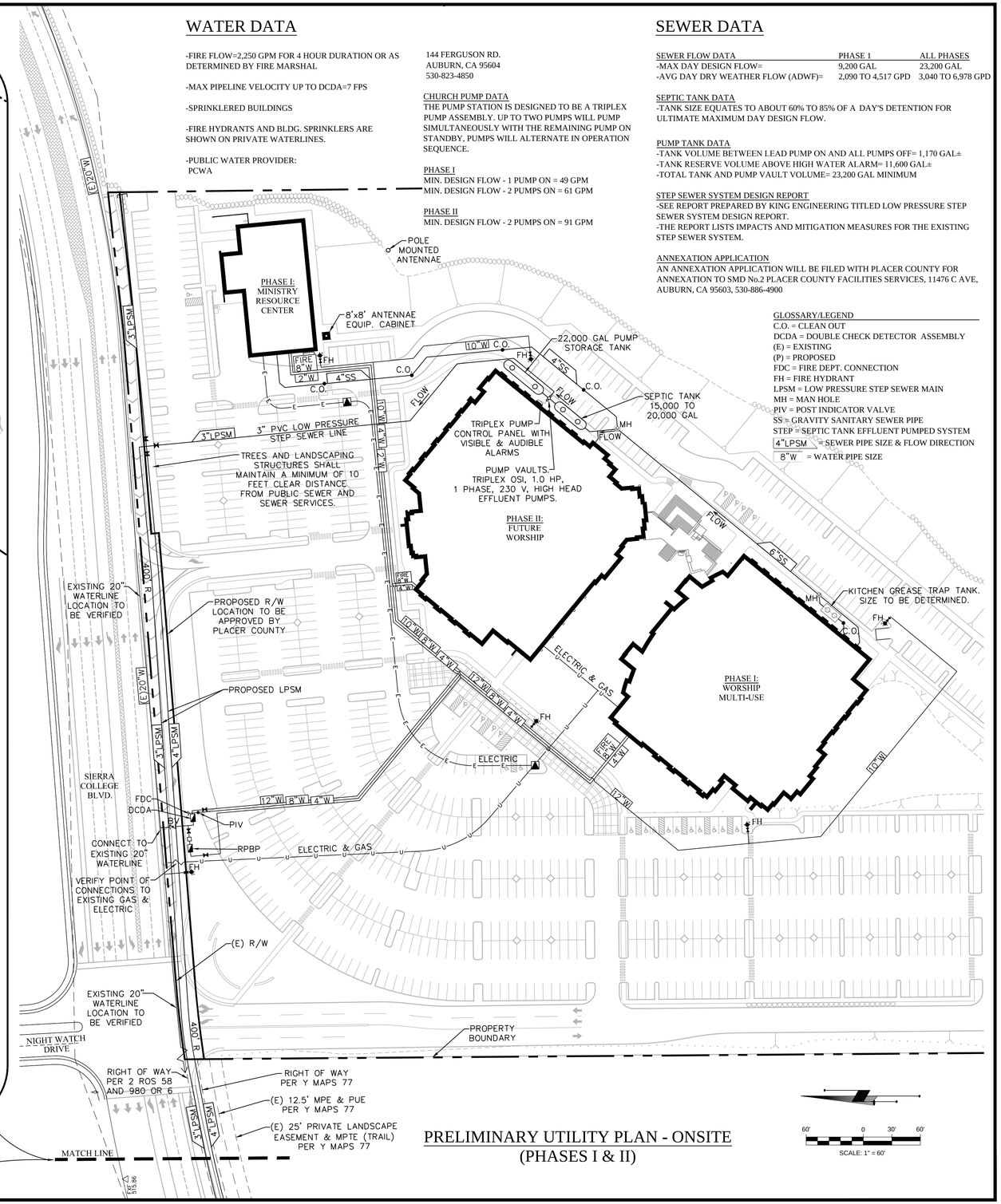
SEPTIC TANK DATA
-TANK SIZE EQUATES TO ABOUT 60% TO 85% OF A DAY'S DETENTION FOR ULTIMATE MAXIMUM DAY DESIGN FLOW.

PUMP TANK DATA
-TANK VOLUME BETWEEN LEAD PUMP ON AND ALL PUMPS OFF= 1,170 GAL±
-TANK RESERVE VOLUME ABOVE HIGH WATER ALARM= 11,600 GAL±
-TOTAL TANK AND PUMP VAULT VOLUME= 23,200 GAL MINIMUM

STEP SEWER SYSTEM DESIGN REPORT
-SEE REPORT PREPARED BY KING ENGINEERING TITLED LOW PRESSURE STEP SEWER SYSTEM DESIGN REPORT.
-THE REPORT LISTS IMPACTS AND MITIGATION MEASURES FOR THE EXISTING STEP SEWER SYSTEM.

ANNEXATION APPLICATION
AN ANNEXATION APPLICATION WILL BE FILED WITH PLACER COUNTY FOR ANNEXATION TO SMD No.2 PLACER COUNTY FACILITIES SERVICES, 11476 C AVE, AUBURN, CA 95603, 530-886-4900

GLOSSARY/LEGEND
C.O. = CLEAN OUT
DCDA = DOUBLE CHECK DETECTOR ASSEMBLY
(E) = EXISTING
(P) = PROPOSED
FDC = FIRE DEPT. CONNECTION
FH = FIRE HYDRANT
LPSM = LOW PRESSURE STEP SEWER MAIN
MH = MAN HOLE
PIV = POST INDICATOR VALVE
SS = GRAVITY SANITARY SEWER PIPE
STEP = SEPTIC TANK EFFLUENT PUMPED SYSTEM
4"LPSM = SEWER PIPE SIZE & FLOW DIRECTION
8"W = WATER PIPE SIZE



PRELIMINARY UTILITY PLAN - ONSITE
(PHASES I & II)

© KING ENGINEERING INC. DRAWINGS AND DIGITAL DRAWING FILES ARE NEITHER FINAL NOR ARE THEY TO BE USED FOR FINAL DESIGN OR CONSTRUCTION UNTIL THEY ARE TRANSFORMED INTO HARD COPY AND SIGNED BY THE ENGINEER. ALL DRAWINGS AND DATA CONTAINED WITHIN THIS FILE ARE THE PROPRIETARY PROPERTY OF KING ENGINEERING, INC. NO UNAUTHORIZED USE, REUSE, OR DUPLICATION OF THESE DRAWINGS AND/OR DATA IS PERMITTED WITHOUT THE EXPRESS WRITTEN CONSENT OF KING ENGINEERING, INC.
H:\1PROJ\04-18-AMAZING\DWG\EQ-C2.0.DWG 4/19/2011 11:17 AM

AMAZING FACTS MINISTRY

PRELIMINARY UTILITY PLAN

PLACER COUNTY, CALIFORNIA - APRIL 4, 2011

KING ENGINEERING INC.
PLANNING
ENGINEERING
CONST. SUPPORT
563 Brunswick Road, Suite 11
Grass Valley, California 95945
(530)272-8328 FAX:(530)272-6039

SHEET NO.
C2.0

SOUTH PLACER MUNICIPAL UTILITY DISTRICT

RECEIVED
JUL 08 2009
KING ENGINEERING

July 7, 2009

King Engineering, Inc.
563 Brunswick Rd
Suite 11
Grass Valley CA 95945

Attention: Mr. George Hansen

Subject: Amazing Facts Church
Sierra College Blvd.
SPMUD Sewer Capacity

Dear George:

Regarding your letter dated June 11, 2009 and the Step Sewer System Design Report, please be advised that the SPMUD Sewer Collections System has adequate capacity to accommodate the 201 gpm peak flow from this area (existing Cavitt Ranch Estates, proposed Amazing Facts Church, and potential 34 future EDU') s.

As a reminder, upon completion of the County's Annexation of the area into its SMD2, the existing SPMUD/County Agreement will need to be amended. Also, SPMUD will need to review and approve that aspect of the improvement plan related to the modification of the connection to Manhole RKLN01.

If there are any questions or a need for more information, please don't hesitate to call.

Sincerely,

Richard Stein
Engineering Manager

RS/jag

5807 SPRINGVIEW DRIVE • ROCKLIN, CALIFORNIA 95677 • PHONE (916) 786-8555 • FAX (916) 786-8553