

Final Project Report

Aptos Esplanade Sewer Replacement Project



Santa Cruz County Sanitation District (SCCSD)

American Recovery and Reinvestment Act (ARRA) Agreement #08-318-550-1

California Clean Water State Revolving Fund (CWSRF) Project # C-06-6906-110

Proposition 50 Project # #06-299-550-1

Clean Beaches Initiative (CBI) Proposition 50 funding (ARRA restart)

Prepared for State Water Resources Control Board (SWRCB)

February 24, 2012

A handwritten signature in blue ink, appearing to read "John Presleigh", is written over a horizontal line.

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I Problem Statement & Relevant Issues

Introduction

The Aptos Esplanade Sewer Replacement Project was initiated under (CBI) Grant #06-299-550-1. Construction began in September 2008, but site conditions changed dramatically due to very high groundwater levels. This necessitated a complete re-design of the project. During the re-design phase in the fall of 2008, CBI grant funding was suspended due to the state budget crisis.

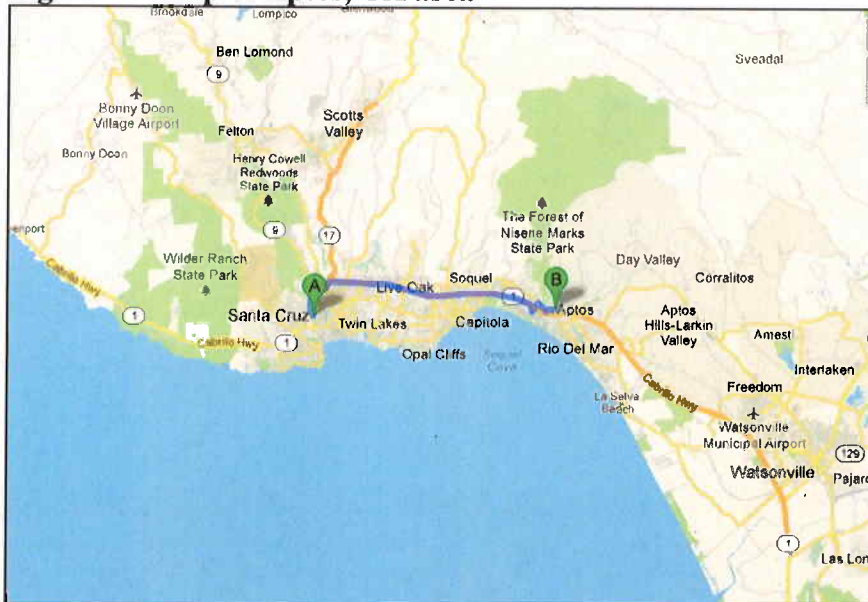
In February 2009, President Obama signed ARRA into law. This provided more than \$280 million in funding to the California CWSRF. The Aptos Esplanade Sewer Replacement Project was “re-started” with ARRA funds and a new funding agreement totaling \$485,136 was executed in December 2009. The re-designed Aptos Esplanade Sewer Replacement Project was put out for bid and the contract was awarded in November 2009. Amendment 1 was processed in January 2010.

All SWRCB and ARRA reporting requirements were met including eight progress reports, four invoices, an annual reports in September 2009 and September 2010, six ARRA Jobs Reports, two disadvantage enterprise reports, annual and final Monitoring Reports, the Natural Resources Project Inventory (NRPI) form, and photo documentation. Signs crediting ARRA were in place for the duration of the project. All Buy American and Davis Bacon wage requirements were met.

Background

The Aptos Esplanade Sewer Replacement Project is located in Aptos, California, about nine miles east of the city of Santa Cruz in Santa Cruz County (see Figure 1: Map of Aptos, California area).

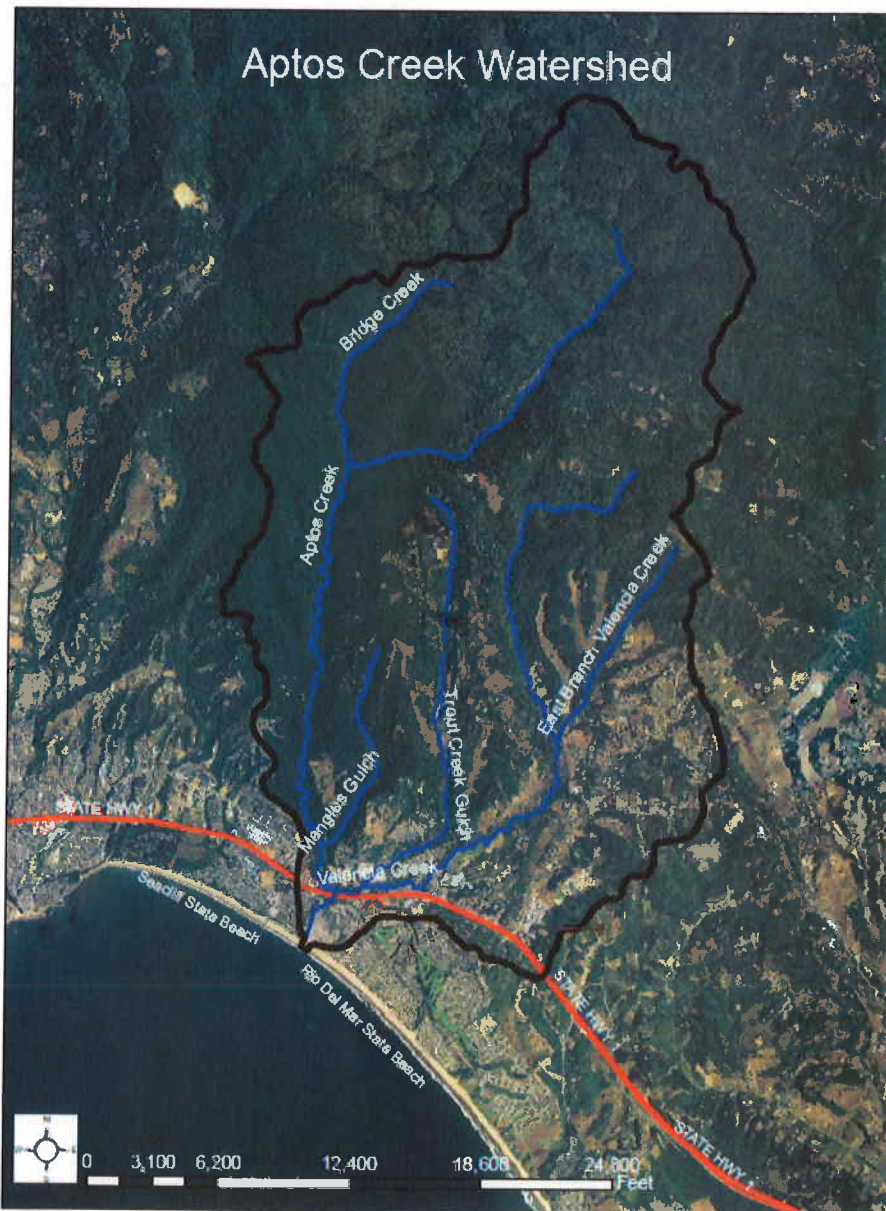
Figure 1 – Map of Aptos, CA area



Historically, Aptos Beach and the Aptos Creek Lagoon have had relatively high bacteria levels and have been frequently posted as unsafe for swimming. From 2000-2004 Aptos/Rio Del Mar Beach was closed a total of 97 days with no associated sewage spills. Aptos Creek is on the 303(d) list for bacterial contamination. Based on historic and recent data, fecal coliform bacteria concentrations exceed the acceptable levels for water contact recreational use¹ during both wet and dry seasons. See Figure 2 for a map of the Aptos Creek Watershed.

Aptos Creek is the primary source of bacteria at Aptos/Rio Del Mar Beach, and the highest bacteria levels occur from Valencia Creek to the mouth of the creek. Ribotyping analysis of the

Figure 2 - Aptos Creek Watershed



¹Water Quality Control Plan, Central Coast Region (Basin Plan)

source of fecal coliform shows that the human contribution is about 2% in Aptos Creek and at the confluence with Monterey Bay. This beach is identified as "Priority" in the Clean Beach Task Force Proposition 50 Guidelines for these reasons: 1.) The beaches have a high frequency (greater than 4 percent) of exceeding bacterial standards during weekly monitoring; 2.) They have consistently demonstrated bacterial contamination problems.

Impairment is confined to the lower reaches of Aptos Creek. Leaks from the sewage collection system are one of several contributing factors. In general, the sewers in the Aptos Esplanade area are old and in need of repair or replacement. Most sewer lines were constructed in 1960's or earlier, although several hundred feet of sewer main located east of Aptos Creek were replaced with polyvinyl chloride (PVC) pipe in the 1980s and early 1990's. The original sewers are rigid clay or asbestos concrete (AC). Most private sewer laterals are original clay piping and were connected to the sewer main in the 1960's. All but a few of the lateral connections of the pipe are break-in connections that do not have saddles to prevent liquid flow in and out of the pipes. Any mortar around active and abandoned lateral connections is now cracking or non-existent. Many laterals show a slime build up at the connection to the main indicating a leaking of surface water into the sewers.

II Project Goals and Objectives

Purpose

The purpose of this project was to replace leaky sewer lines adjacent to Aptos Creek and Aptos Beach to improve water quality at the beach and in the creek. The project consisted of replacing approximately 4,300 feet of sewer collection lines and 27 manholes and connecting the new sewer main to the existing sewer system. The old lines were made of rigid clay pipe or asbestos cement pipe constructed in the 1960's. By replacing the sewer lines with plastic pipe and the old brick manholes with cement/mortar manholes, the SCCSD anticipates leakage from sewers in these areas will be eliminated.

Goal and Objectives

The objective of this project was to eliminate leakage from sewer lines with the most potential to impact Aptos Creek and Aptos/Rio Del Mar Beach.

The water quality objectives of the project were to:

1. Characterize pre-project and post-project levels of nitrogen compounds and indicator bacteria (*E. coli*, enterococcus, and total coliform) in Valencia Creek, Lower Aptos Creek and ocean waters at Aptos/Rio del Mar Beaches.
2. Characterize amount of contamination originating from human sources before and after project completion at the above locations.

III Project Description

Background

Santa Cruz County Environmental Health Services (EHS) monitored Aptos Creek and tributaries in 2005 in order to better characterize sources of bacterial contamination. This monitoring built on previous investigations by EHS, which included water quality testing, genetic testing to identify sources of bacteria, and a health risk survey to measure the actual incidence of illness at the most heavily used county beaches, including Aptos/Rio Del Mar. Information from both of these efforts is presented in a report titled "Assessment of Sources of Bacterial Contamination At Santa Cruz County Beaches," March 2006. Ribotyping analysis of the source of fecal coliform showed that the human contribution is about 2% in Aptos Creek and in the ocean near Aptos Creek. The highest bacteria levels in the creek historically occur from the confluence with Valencia Creek to the mouth of Aptos Creek Lagoon. Private sewer laterals have in the past been identified as a source of contamination in the total maximum daily loads (TMDL) for pathogens in the Aptos Creek Watershed (Office of Administrative Law approved 10/2010). See "Monitoring" below for an outline of the Monitoring Program; see Table 1 for a list of sampling locations and frequency (annual); see Figure 3 for a map of the sampling locations.

Design

The project did not need any discretionary permits and received a California Environmental Quality Act (CEQA) Notice of Exemption. The SCCSD submitted Coastal Development Permit Waiver 3-09-031-W to the California Coastal Commission on November 18, 2010. It became effective on that date.

SCCSD staff worked with Harris and Associates to design the project. In September 2008, when construction was halted due to very high groundwater levels, the SCCSD hired Pacific Crest Engineering (PCE) to do a geotechnical investigation and provide recommendations for a redesign of the project. PCE also installed a piezometer in the boring (at the parking lot) on the project site so that the SCCSD could monitor the water levels over time.

Construction

The SCCSD Board approved the plans and specifications for advertising on August 19, 2009. The project was advertised September 3, 2009. The pre-bid meeting was held on September 22, 2009. The SCCSD received six bids for the construction of the Aptos Esplanade Sewer Extension Project. The low bidder was Mountain Cascade of Livermore, CA with a bid of \$2,143,185. The Engineer's Estimate for construction of the project was \$2,186,000.

The SCCSD Board approved the Award of Contract on October 15, 2009 and the Notice to Proceed was issued October 30, 2009. On January 20, 2010, the SCCSD approved a no-cost Contract Change Order to amend the contract provisions with Exhibit H Davis Bacon Requirements of the ARRA Grant Agreement. Construction began in January 2010 and was completed by September 2010. The work consisted of replacing approximately 4,300 feet of sewer collection lines and 27 manholes and air testing and video testing the sewer line. The contractor also completed mandrel testing.

The SCCSD Board approved a Notice of Completion on January 20, 2011. Water quality monitoring occurred in accordance with the approved Monitoring Plan. Monitoring occurred for one full year after the completion of construction. Santa Cruz County EHS completed an annual summary on monitoring activities in December 2010. This was submitted to the grant manager on January 4, 2011. The final Monitoring Report is presented in its entirety in Appendix B.

Monitoring

Water quality monitoring was a requirement associated with the grant. The Clean Beaches Task Force recommended that the SCCSD work with EHS to develop a monitoring approach to quantify the benefits of the project. EHS created a Monitoring and Reporting Plan in April 2008 and revised it in September 2008. The monitoring included sampling from all major tributaries throughout the study area in order to measure sources of indicator bacteria, even if they originated outside the project area.

Monitoring commenced in February 2008 and continued until September 2011, one full year after the completion of construction. Parameters and methods for monitoring are described in the Monitoring Report in Appendix B.

Monitoring Program

Data used in the analysis for this project was generated from several concurrent monitoring efforts: AB 411 beach sampling, routine County sampling of Aptos Creek, and special sampling specifically for this project. Sampling locations and frequencies are listed in Table 1, and plotted on Figure 3. The monitoring includes sampling from all major tributaries throughout the study area in order to measure sources of indicator bacteria, even if they originate outside the project areas.

Parameters and methods were as follows:

- Samples were tested for total coliform, *E.coli*, and *Enterococcus* bacteria using IDEXX Chromogenic Testing Method.
- EPA Methods used:
 - Nitrate and ammonia - EPA Method 300 using a Dionex AS9-SC Analytical Column
 - Ammonia - EPA Method 350.3 for Ion Selective Electrode.
- Creek samples were tested for pH, dissolved oxygen, temperature and conductivity using a Horiba Water Checker, Model U-10. Water samples were taken and analyzed in the laboratory for turbidity using a Hach 2100P Turbidometer.
- Human Specific Bacteroides Analysis was conducted at the County of Santa Cruz Public Health Lab using an Applied Biosystems Step One Real Time PCR system. The Step One system detects and determines the amount of nucleic acids present in biological samples and is capable of gene expression analysis, SNP genotyping, and viral load analysis.

Sampling under the current effort started in February 2008 and continued through August 2011. The sampling frequency was as follows (see Table 1 for a list of sampling locations and Figure 3 for a map of sampling locations):

- Three stations were sampled weekly – two were analyzed for Total Coliform, *E.coli*, and *Enterococcus*. The third weekly station, Aptos Creek Mouth, was only analyzed for Fecal Coliform (or *E.coli*)
- The remaining stations, along with Aptos Creek Mouth, were sampled monthly.
- Once each year during the spring, the monthly stations were sampled three additional days (one day per week) over a three week period for a total of 5 samples over a 30-day period
- Monthly samples were collected at two sites, AO and AO3, and were analyzed for bacterioides

Table 1 – Sampling Locations and Frequency (Annual)

ID	Site Description	Sampling Frequency			Total Samples Per Year
		Weekly	Monthly	Bacterioides	
O110	RDM BEACH @ APTOS C MOUTH	X			52
O140	SEACLIFF BEACH @ CEMENT SHIP	X			52
A0	APTOS CREEK @ MOUTH	X ¹	X	X	79
A00	APTOS CR @ WALK BRIDGE		X		15
A01	APTOS CR. @ MARINA		X		15
A02	APTOS CR. @ WINFIELD		X		15
A03	APTOS C @ BRIDGE ON SPRECKLES		X	X	27
A1	VALENCIA C @ APTOS C		X		15
A11	TROUT GULCH @ VALENCIA CREEK		X		15
A12	VALENCIA CREEK AB TROUT GULCH		X		15
A122	VALENCIA CR @ POLO GROUNDS PARK		X		15
A2	APTOS C @ VALENCIA C		X		15

¹Fecal coliform only

Project Costs

The project stayed within budget. A total of \$485,136.00 of ARRA/Proposition 50 funding was used for construction costs only. There was no match required for this project.

Total Financing Summary

	Estimated	Actual
Agency's Cash	\$1,916,348	\$2,921,302
CWSRF Financing (via ARRA)	\$485,136	\$485,136
Other funding sources	\$0	\$0
Total Costs	\$2,401,484	\$3,406,438

Figure 3 – Map of Aptos Creek Watershed Sampling Locations



IV Monitoring Results

The following summarizes the monitoring report found in Appendix B. Please refer to that report for detailed results and discussion.

The data continue to show elevated levels of indicator bacteria in Aptos Creek. Despite elevated levels in the creek, there were no beach postings between 2009 and 2011 at either Rio del Mar (station O110) or Seacliff State Beach (station O140). Bacteria levels are highest at the creek mouth (A00) and generally decline as you go further upstream. The high number of birds consistently observed in the river's lagoon may account for some of this trend. This theory is supported by the fact that prior testing using ribotyping indicated a significant source of bird contamination in Aptos Creek at the mouth.

It is worth noting that bacteria counts in Aptos Creek were relatively low, but increased between 2008 and 2010 before decreasing in 2011. The amount of flow in the creek when each sample was collected may be one factor influencing the results.

Within the project area, prolonged precipitation will increase groundwater elevations, and as this happens, shallow groundwater can come into contact with pollutants associated with leaking or damaged sewer lines and septic systems. Additionally, rainfall will mobilize contaminants collected on the ground surface during the dry months. As more precipitation falls, more runoff is generated, and generally more pollutants are carried to surface waters as a result. However, at a certain point—with enough rainfall and runoff—pollutants may become diluted and concentrations may decrease.

We generally know that 2008 and 2009 were dry years, and 2011 was a particularly wet year. Aptos Creek is not gauged, but flow records from the adjacent watershed (Soquel Creek) can be useful in a qualitative discussion about the influence that flow conditions may have had on bacterial sample results. To investigate this, we compiled the average daily flow from Soquel Creek each day that we sampled for water quality. We calculated the geometric mean of the bacteria results for each year and calculated the average flow on the sample days during that year. (We used geometric mean for the bacterial results because the data is not normally distributed, and thus an arithmetic mean is not appropriate for that data). Table 2 displays these results. Data indicate that flow in 2011 was greater than in other years, and this supports the idea that dilution may have played a factor in these results.

Table 2 - Geometric mean *E.coli* and average flow by year

Year	GeoMean <i>E.coli</i> @ A01	Average Flow (cfs)
2008	246	16
2009	373	10
2010	747	20
2011	200	28

While dilution may account for the decrease in bacteria counts between 2010 and 2011, we cannot rule out the possibility that the decrease in bacteria could be a result of project implementation. Regardless, additional monitoring would be needed to verify this conclusion.

Valencia Creek (station A122) and Trout Gulch (station A11) both have high levels of indicator bacteria and elevated levels of nitrate. Nitrate values in the County are generally low, and our experience tells us that when higher concentrations of nitrate are observed there is usually a source in close proximity to the sampling station. Since residences on Trout Gulch and Valencia Creek are on septic systems, we assume that they may be the cause of these high results. In fact, staff observed a failing septic system along Trout Gulch. The residence was red-tagged by the County and has since been vacated.

Statistical analysis using an Excel macro that performs a Mann-Kendall test for trends was used to assess the data for statistically significant trends. Mann-Kendall is used for non-parametric (i.e. not normally distributed) data, and the test incorporates seasonality so that results are

compared month to month (i.e. January to January). The only significant trends identified were slightly increasing trends for *E.coli* at stations A03 and A00 for the months of June and May, respectively. All other results were not significant; however, they generally indicated decreasing concentrations of indicator bacteria counts and nitrate concentrations.

Human specific bacteroides were detected with the highest percentage occurring in Trout Gulch between 2008 and 2010, when three of four samples tested positive. Not only did three of the four Trout Gulch samples test positive for human specific bacteroides; one test had a considerably high result. (See Table 3 for a complete list of all results.) For perspective, these results can be compared to various sample results from the San Lorenzo River and Soquel Creek watersheds, where nearly half to one-third of the samples tested positive for human-specific bacteroides, respectively. None of the 2011 samples tested positive for human-specific bacteroides. Based on these results, some inference could be made that the project reduced the human component of indicator bacteria, however additional and ongoing monitoring would be needed to support such a conclusion. Santa Cruz County EHS recommends that more work be done in Trout Gulch to identify and eliminate potential sources of bacteria.

V Discussion

Identifying statistically significant water quality trends is challenging, and attributing trends to management efforts is even more difficult. This is due in large part to the temporal and geographic variability inherent in this type of sampling, and because management efforts are usually small in scale compared to the larger systems they occupy and the stressors upon those systems.

Nevertheless, ongoing monitoring for trends and targeted studies combined with careful analysis can begin to paint a picture of whether or not water quality is improving. Often, it is the case that numerous sources are contributing bacteria via several transport mechanisms to receiving waters. It is necessary to take an incremental approach to understanding impacts, implementing projects and evaluating results. A prudent approach includes identifying the most likely sources, addressing them, and then moving to target the next-likely source. Ideally, over time, ongoing monitoring should show changes in environmental condition resulting from this incremental approach.

Next Steps

Given that this was a relatively small-scale project in a large watershed, the SCCSD and EHS recognize the need to continue investigating and addressing a variety of non-point pollution problems in Aptos, Valencia and Trout Gulch watersheds beyond this one project. For instance, through the Monitoring Plan for this project, EHS discovered that Valencia Creek and Trout Gulch both have high levels of indicator bacteria and elevated levels of nitrate, suggesting some contribution from septic systems. More work should be done in Trout Gulch to identify and eliminate potential sources of bacteria, based on these results. EHS and SCCSD will continue to pursue funding sources to assist with projects to improve water quality in all three watersheds.

Table 3: Results Summary

Station Number	LOCATION	Year	Number of Samples	Logmean E.coli	Logmean Enterococcus	Logmean Total Coliform	Logmean Fecal Coliform	Mean NO3-N (mg-N/mL)	Mean NH3-N (mg - N / 100 mL)
O110	Rio del Mar Beach	2008	80	47	13	146			
O110	Rio del Mar Beach	2009	59	40	17	140			
O110	Rio del Mar Beach	2010	60	44	16	151			
O110	Rio del Mar Beach	2011	57	39	13	107			
O140	Seacliff Beach	2009	64	29	9	61			
O140	Seacliff Beach	2010	59	25	10	47			
O140	Seacliff Beach	2011	41	33	11	63			
A0	Aptos C. @ Mouth	2008	62	279	39	2,060	488	0.08	0.03
A0	Aptos C. @ Mouth	2009	61	762	425	6,803	552	0.08	0.01
A0	Aptos C. @ Mouth	2010	60	789	356	7,989		0.15	0.02
A0	Aptos C. @ Mouth	2011	36	288	343	2,048		0.1	<0.01
A00	Aptos C. Below Walk Bridge	2008	14	272	42	2,202		0.11	0.01
A00	Aptos C. Below Walk Bridge	2009	9	508	391	4,666		0.06	0.01
A00	Aptos C. Below Walk Bridge	2010	9	600	278	7,338		0.2	0.01
A00	Aptos C. Below Walk Bridge	2011	6	481	186	2,454		0.12	<0.01
A01	Aptos C. @ Stephan St.	2008	14	245	59	1,875		0.06	0.01
A01	Aptos C. @ Stephan St.	2009	11	372	229	5,484		0.06	0.01
A01	Aptos C. @ Stephan St.	2010	10	748	388	7,311		0.14	0.01
A01	Aptos C. @ Stephan St.	2011	6	200	145	1,541		0.12	<0.01
A02	Aptos C. @ Winfield	2008	14	130	37	1,243		0.09	0.01
A02	Aptos C. @ Winfield	2009	11	278	255	4,091		0.08	0.02
A02	Aptos C. @ Winfield	2010	11	350	229	3,771		0.16	0.01
A02	Aptos C. @ Winfield	2011	6	242	97	1,608		0.13	<0.01
A03	Aptos C. @ Spreckles	2008	21	180	38	1,656		0.13	0.01
A03	Aptos C. @ Spreckles	2009	11	196	231	2,272		0.07	0.01
A03	Aptos C. @ Spreckles	2010	11	342	223	3,051		0.17	0.01
A03	Aptos C. @ Spreckles	2011	6	187	119	1,949		0.13	<0.01
A1	Valencia C. @ Aptos C.	2008	35	584	144	3,366	688	0.65	0.01
A1	Valencia C. @ Aptos C.	2009	25	204	161	1,979	240	0.64	0.01
A1	Valencia C. @ Aptos C.	2010	27	705	531	6,397		0.56	0.01
A1	Valencia C. @ Aptos C.	2011	11	366	196	2,692		0.42	<0.01
A11	Trout Gulch @ Valencia C.	2008	14	2,643	713	9,270		0.95	0.01
A11	Trout Gulch @ Valencia C.	2009	11	1,470	1,987	7,475		1.22	0.01
A11	Trout Gulch @ Valencia C.	2010	8	1,357	1,000	7,674		0.64	0
A11	Trout Gulch @ Valencia C.	2011	3	1,054	195	3,085			<0.01
A12	Valencia Cr. @ Trout Gulch	2008	14	270	83	2,399		0.45	0.01
A12	Valencia Cr. @ Trout Gulch	2009	11	470	240	3,446		0.33	0.01
A12	Valencia Cr. @ Trout Gulch	2010	10	448	345	5,212		0.42	0
A12	Valencia C. @ Trout Gulch	2011	6	214	155	1,922		0.36	<0.01
A122	Valencia C. above School	2008	15	243	46	1,638		0.23	0.03
A122	Valencia C. above School	2009	11	204	114	1,839		0.26	0.01
A122	Valencia C. above School	2010	10	381	252	3,373		0.25	0
A122	Valencia C. above School	2011	6	491	112	2,356		0.26	<0.01
A2	Aptos C. @ Valencia C.	2008	27	46	12	683	72	0.06	0.01
A2	Aptos C. @ Valencia C.	2009	25	55	45	1,343	73	0.03	0.01
A2	Aptos C. @ Valencia C.	2010	23	93	58	1,551		0.03	0
A2	Aptos C. @ Valencia C.	2011	10	48	46	622		0.08	<0.01

VI Conclusions

The project was constructed on time and according to plan, resulting in the construction of 4,300 feet of sewer collection lines and 27 manholes and connecting the new sewer main to the existing sewer system. See Figure 4 for a map of where connections were made to the sewer system and laterals.

The new sewer lines do not leak, and are a vast improvement from the deteriorated sewage collection system that was in place. Therefore, regardless of the water quality monitoring results discussed above, the Aptos Esplanade Sewer Replacement project has met its goal to eliminate leakage from sewer lines with the most potential to impact Aptos Creek and Aptos/Rio Del Mar Beach.

See Appendix D for a map of connections to the sewer system and laterals.

Given the monitoring results, it is difficult to identify any changes in water quality conditions directly resulting from the project's implementation. Yet by removing one more potential source of bacteria and identifying areas where future work should be focused, this project moves us one step closer to knowing how to address bacterial contamination in Rio del Mar Beach and Seacliff State Beach

SCCSD acknowledges the contributions of the State Water Resources Control Board, which provided partial funding for this project. The contents of this document do not necessarily reflect the views and policies of the State Water Resources Control Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use (Gov. Code, § 7550,40 CFR § 31.20)."

Contact Information

Questions about this project or this report should be directed to:

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APPENDIX A
Summary of Deliverables

DESCRIPTION	Milestone Date	Date Submitted
Quality Assurance Project Plan	Completed	
Monitoring Plan	Completed	
WORK TO BE PERFORMED BY RECIPIENT	--	
Project Design	Completed	
As-Advertised Construction Documents	August 2009	09/30/2009;
Bid Summary, Proof of Advertising, and Construction Notice to Proceed	Sept. 2009	10/19/2009
Project Implementation	Nov. 2009 – Nov. 2010	8/1/2011 as-built drawings submitted
Photo Documentation (Pre, During, and Post)	Sept. 2009 – Nov. 2010	1/15/2010; 9/30/2010
Invoicing	Quarterly	1/28/2010; 4/15/10; 7/8/2010; 9/30/2010; 1/20/2011; 4/20/2011
Construction completion date	Nov. 1, 2010	9/1/2010
Notice of Completion	Dec. 1, 2010	1/20/2011
Project Completion Date	Feb. 28, 2012	
REPORTING	--	
Progress Reports	Quarterly	10/30/2009; 1/30/2010; 4/15/10; 7/8/2010; 9/30/2010; 1/20/2011; 4/20/2011; 7/30/2011; 10/20/2011; 1/20/2011
Natural Resource Projects Inventory Project Survey Form	At end of project	11/28/2011
Signed Cover Sheets for all permits	As needed	
Annual Progress Summary	Annually by 9/30	10/30/2009; 9/30/2010; 9/30/2011
Annual Monitoring Summary	Annually	1/5/2011
Draft Project Certification	November 30, 2011	11/8/2011
Final Project Certification	December 31, 2011	2/24/2012

APPENDIX B
Monitoring Report

Water Quality Monitoring Report
Clean Beaches Initiative

Aptos Esplanade Sewer Replacement Project
American Recovery and Reinvestment Act (ARRA) Agreement #08-318-550-1
Clean Water State Revolving Fund (CWSRF) Project # C-06-6906-110
Proposition 50 Project # #06-299-550-1

Aptos Beach at Valencia Creek Sewer and Lift Station
Project #: C-06-6909-110
Grant Agreement #: 08-356-550-1

County of Santa Cruz Environmental Health Services (EHS)

September 21, 2011
Revised December 19, 2011

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1.0 Introduction

The Santa Cruz County Sanitation District (SCCSD) was awarded funding under the Clean Beach Initiative (CBI) to reduce sources of bacterial contamination at Seacliff and Rio del Mar State Beaches. Both beaches experience periodic exceedences of recreational water quality standards, and the Aptos Creek Lagoon is permanently posted warning visitors against body contact recreation. Previous studies have demonstrated that the primary source of fecal indicator bacteria to the beaches is Aptos Creek and its tributaries Trout Gulch and Valencia Creek. Microbial source testing in lower Aptos Creek has confirmed that a small percentage of contamination is derived from human waste, with aging leaking sewer lines and upstream septic systems suspected as sources. Video testing confirmed the poor conditions of the sewers in the Aptos Esplanade area.

Accordingly, CBI grants have been awarded to the SCCSD to help fund two sewer projects to address these concerns:

1. Replacement of mainlines in the Aptos (Rio del Mar) Esplanade area
2. Construction of a sewer extension and pump station to facilitate conversion of residences from septic tanks to sewer along Valencia Creek

2.0 Background

The Aptos Creek Watershed is located in southern Santa Cruz County and encompasses approximately 21 square miles (Figure 1). Aptos Creek's main tributaries are Valencia Creek, Mangels Gulch and Bridge Creek. Trout Gulch is a tributary to Valencia Creek. Aptos Creek drains to the Aptos Creek Lagoon and ultimately to the ocean adjacent to Seacliff and Rio Del Mar State Beaches, south of Santa Cruz, California. Aptos Creek, which includes Valencia Creek and Trout Gulch, is listed as impaired for fecal indicator bacteria, and a Total Maximum Daily Load is in place.

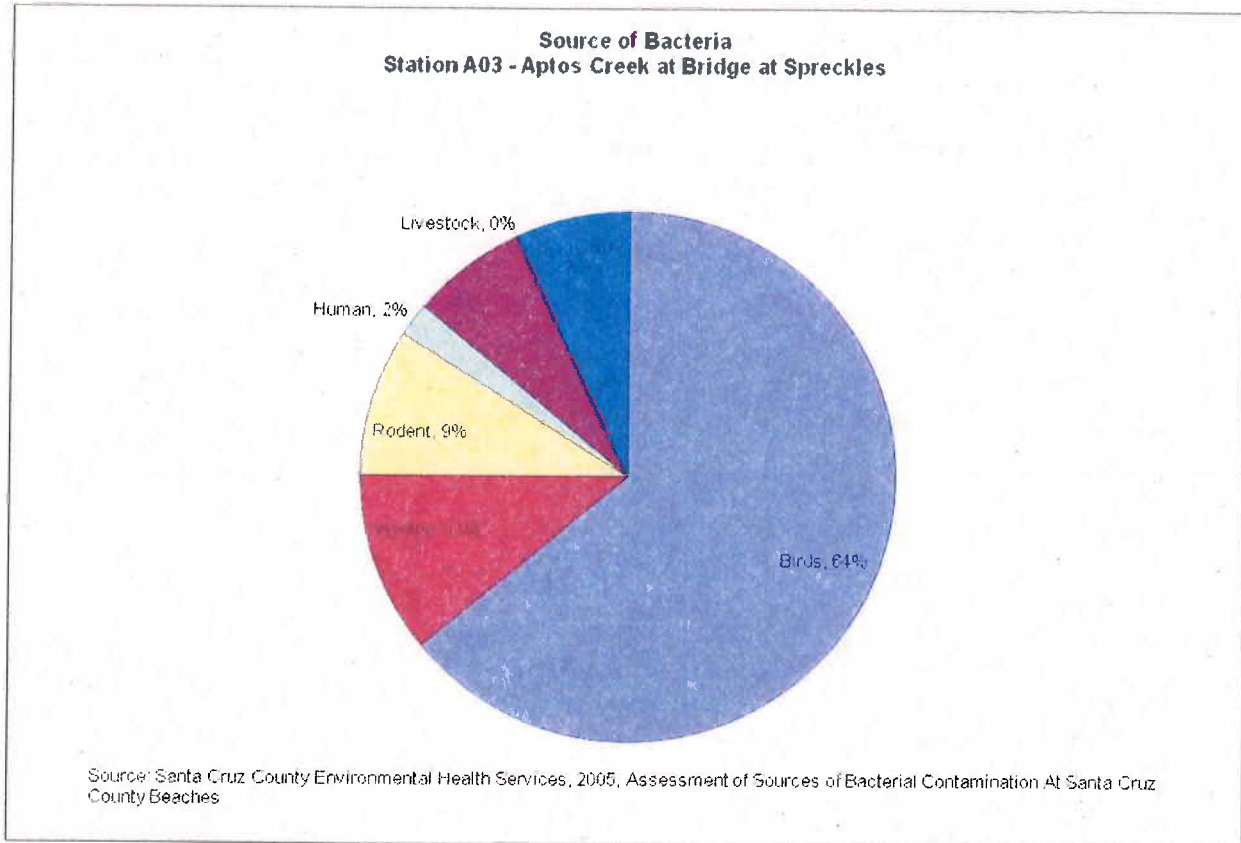
Rio Del Mar and Seacliff Beaches are Clean Beaches Task Force priority beaches identified in the Prop 50 Guidelines. The beaches have a high frequency (>4 percent) of bacterial standard exceedences during weekly monitoring. From 2000-2004, Rio Del Mar Beach was posted a total of 69 days with no associated sewage spills, indicating that the contamination is generated from non-point sources.

Figure 1 - Aptos Creek Watershed



EHS monitored Aptos Creek and tributaries in 2005 in order to better characterize sources of bacterial contamination. This monitoring plan was built on previous investigations by EHS, which included water quality testing, genetic testing to identify the sources of bacteria and a health risk survey to measure the actual incidence of illness at the most heavily used county beaches, including Rio Del Mar. Ribotyping for analysis of the source of fecal coliform shows that the human contribution is about 2% in Aptos Creek and in the ocean near the mouth of Aptos Creek (Figure 2).

Figure 2 - Sources of Bacteria - Aptos Creek



SCCSD staff believes that failing septic systems and leaks from the sewage collection system contribute a large portion of the human contamination load. In general, the sewers in the Aptos Esplanade area are old and in need of repair or replacement. Video testing indicated that sewer lines and laterals in the Rio del Mar area were found to be in poor condition and are potential sources of sewage leaks to the creek. Most sewer lines were constructed in 1960's or earlier, although several hundred feet of sewer main located east of Aptos Creek were replaced with polyvinyl chloride (PVC) pipe in the 1980s and early 1990's. The original sewers are rigid clay or asbestos concrete (AC). Most private sewer laterals are original clay piping and were connected to the sewer main in the 1960's. All but a few of the lateral connections of the pipe are break-in connections that do not have saddles to prevent liquid flow in and out of the pipes. Any mortar around active and abandoned lateral connections is now cracking or non-existent. Many laterals show a slime build up at the connection to the main indicating a leaking of surface water into the sewers.

Bacteria levels discharging from Aptos Creek generally decline rapidly once the creek enters the ocean. This beach here is more open and exposed, with better potential for dilution and mixing than in Capitola and Santa Cruz.

3.0 Summary of Activities

The Aptos Esplanade Sewer Replacement Project was initiated under CBI Grant #C-06-299-550-1. Construction and project monitoring activities began in September 2008 under that grant, but unanticipated high groundwater levels encountered during construction necessitated a project re-design. During the re-design phase in fall 2008, the CBI grant funding was suspended due to the state budget crisis. Monitoring activities continued despite the suspension as part of the County's regular beach monitoring activities.

The Aptos Esplanade Sewer Replacement Project was "re-started" with ARRA funds and a new funding agreement totaling \$485,136 was executed in December 2009. The re-designed Aptos Esplanade Sewer Replacement Project was put out for bid and the contract was awarded in November 2009. Amendment 1 was processed in January 2010.

Construction began in January 2010 and was completed by September 2010. The work consisted of replacing approximately 4,300 feet of sewer collection lines and 27 manholes and air testing and video testing the sewer line. The contractor also completed mandrel testing. Monitoring activities continued for one year following the end of construction activities, ending in August of 2011.

4.0 Monitoring Objectives

1. Characterize pre and post-project levels of nitrogen compounds and indicator bacteria (*E.coli*, enterococcus, and total coliform) in Valencia Creek, Lower Aptos Creek, and ocean waters at Seacliff and Rio del Mar Beaches.
2. Characterize amount of contamination originating from human sources before and after project completion at the above locations.

5.0 Monitoring Methods

Data used in this analysis was generated from several concurrent monitoring efforts: AB 411 beach sampling, routine County sampling of Aptos Creek, and special sampling specifically for this project. Sampling locations and frequencies are listed in Table 1, and plotted on the map in Figure 3. The monitoring includes sampling from all major tributaries throughout the study area in order to measure sources of indicator bacteria, even if they originate outside the project areas.

Parameters and methods will be as follows:

- Samples were tested for Total coliform, *E.coli*, and Enterococcus bacteria using IDEXX Chromogenic Testing Method.
- EPA Methods used:
 - Nitrate and ammonia - EPA Method 300 using a Dionex AS9-SC Analytical Column
 - Ammonia - EPA Method 350.3 for Ion Selective Electrode.
- Creek samples were tested for pH, dissolved oxygen, temperature and conductivity using a Horiba Water Checker, Model U-10. Water samples were taken and analyzed in the laboratory for turbidity using a Hach 2100P Turbidimeter.

- Human Specific Bacteroides Analysis was conducted at the County of Santa Cruz Public Health Lab using an Applied Biosystems StepOne Real Time PCR System. The StepOne System detects and determines the amount of nucleic acids present in biological samples and is capable of gene expression analysis, SNP genotyping, and viral load analysis.

Sampling under the current effort started in February 2008 and continued through August 2011. The sampling frequency was as follows (Table 1)

- Three stations were sampled weekly – two were analyzed for Total Coliform, *E.coli*, and Enterococcus. The third weekly station, Aptos Creek Mouth, were only be analyzed for Fecal Coliform (or *E.coli*)
- The remaining stations, along with Aptos Creek Mouth, were sampled monthly
- Once each year during the spring, the monthly stations were sampled three additional days (one day per week) over a three week period for a total of 5 samples over a 30-day period
- Monthly samples were collected at two sites, AO and AO3, and were analyzed for bacteroides

Table 1 – Sampling Locations and Frequency (Annual)

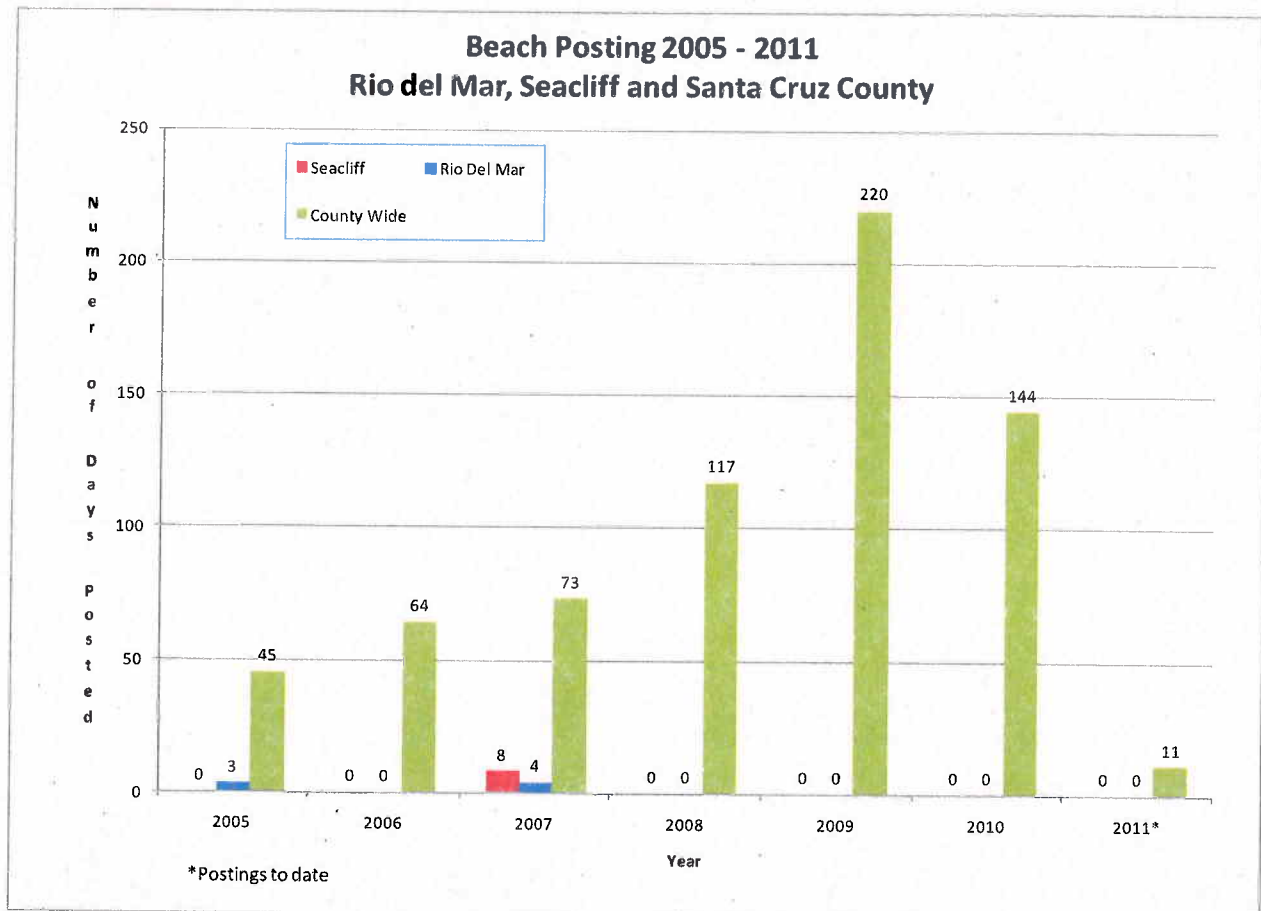
ID	Site Description	Sampling Frequency			Total Samples Per Year
		Weekly	Monthly	Bacterioides	
O110	RDM BEACH@APTOS C MOUTH	X			52
O140	SEACLIFF BEACH @ CEMENT SHIP	X			52
A0	APTOS CREEK @ MOUTH	X ¹	X	X	79
A00	APTOS CR @ WALK BRIDGE		X		15
A01	APTOS CR. @ MARINA		X		15
A02	APTOS CR. @ WINFIELD		X		15
A03	APTOS C @ BRIDGE ON SPRECKLES		X	X	27
A1	VALENCIA C @ APTOS C		X		15
A11	TROUT GULCH @ VALENCIA CREEK		X		15
A12	VALENCIA CREEK AB TROUT GULCH		X		15
A122	VALENCIA CR @ POLO GROUNDS PARK		X		15
A2	APTOS C @ VALENCIA C		X		15

¹Fecal coliform only

6.0 Results

Figure 4 displays beach postings for the entire county and at Rio del Mar and Seacliff Beaches for the years 2005 – 2011 (to date). Although Rio del Mar Beach had some previous history of posting, neither beach was posted in 2008 through 2011. The significantly higher numbers in 2008 – 2010 for the County reflect a large increase in the posting of Cowells Beach.

Figure 4 - Beach Posting - 2005 - 2011



Analytical results are summarized in Table 2, which includes results for over 1,100 analyses conducted on samples from Rio del Mar Beach, Seacliff Beach, Aptos Creek, Valencia Creek, and Trout Gulch. Refer to Figure 4 for locations of the various sample locations.

Table 2 - Results Summary

Station Number	LOCATION	Year	Number of Samples	Logmean Ecol	Logmean Enterococcus	Logmean Total Coliform	Logmean Fecal Coliform	Mean NO3-N (mg-N/mL)	Mean NH3-N (mg - N / 100 mL)
O110	Rio del Mar Beach	2008	80	47	13	146			
O110	Rio del Mar Beach	2009	59	40	17	140			
O110	Rio del Mar Beach	2010	60	44	16	151			
O110	Rio del Mar Beach	2011	57	39	13	107			
O140	Seacliff Beach	2009	64	29	9	61			
O140	Seacliff Beach	2010	59	25	10	47			
O140	Seacliff Beach	2011	41	33	11	63			
A0	Aptos C. @ Mouth	2008	62	279	39	2,060	488	0.08	0.03
A0	Aptos C. @ Mouth	2009	61	762	425	6,803	552	0.08	0.01
A0	Aptos C. @ Mouth	2010	60	789	356	7,989		0.15	0.02
A0	Aptos C. @ Mouth	2011	36	288	343	2,048		0.1	<0.01
A00	Aptos C. Below Walk Bridge	2008	14	272	42	2,202		0.11	0.01
A00	Aptos C. Below Walk Bridge	2009	9	508	391	4,666		0.06	0.01
A00	Aptos C. Below Walk Bridge	2010	9	600	278	7,338		0.2	0.01
A00	Aptos C. Below Walk Bridge	2011	6	481	186	2,454		0.12	<0.01
A01	Aptos C. @ Stephan St.	2008	14	245	59	1,875		0.06	0.01
A01	Aptos C. @ Stephan St.	2009	11	372	229	5,484		0.06	0.01
A01	Aptos C. @ Stephan St.	2010	10	748	388	7,311		0.14	0.01
A01	Aptos C. @ Stephan St.	2011	6	200	145	1,541		0.12	<0.01
A02	Aptos C. @ Winfield	2008	14	130	37	1,243		0.09	0.01
A02	Aptos C. @ Winfield	2009	11	278	255	4,091		0.08	0.02
A02	Aptos C. @ Winfield	2010	11	350	229	3,771		0.16	0.01
A02	Aptos C. @ Winfield	2011	6	242	97	1,608		0.13	<0.01
A03	Aptos C. @ Sprackles	2008	21	180	38	1,656		0.13	0.01
A03	Aptos C. @ Sprackles	2009	11	196	231	2,272		0.07	0.01
A03	Aptos C. @ Sprackles	2010	11	342	223	3,051		0.17	0.01
A03	Aptos C. @ Sprackles	2011	6	187	119	1,949		0.13	<0.01
A1	Valencia C. @ Aptos C.	2008	35	584	144	3,366	688	0.65	0.01
A1	Valencia C. @ Aptos C.	2009	25	204	161	1,979	240	0.64	0.01
A1	Valencia C. @ Aptos C.	2010	27	705	531	6,397		0.56	0.01
A1	Valencia C. @ Aptos C.	2011	11	366	196	2,692		0.42	<0.01
A11	Trout Gulch @ Valencia C.	2008	14	2,643	713	9,270		0.95	0.01
A11	Trout Gulch @ Valencia C.	2009	11	1,470	1,987	7,475		1.22	0.01
A11	Trout Gulch @ Valencia C.	2010	8	1,357	1,000	7,674		0.64	0
A11	Trout Gulch @ Valencia C.	2011	3	1,054	195	3,085			<0.01
A12	Valencia Cr. @ Trout Gulch	2008	14	270	83	2,399		0.45	0.01
A12	Valencia Cr. @ Trout Gulch	2009	11	470	240	3,446		0.33	0.01
A12	Valencia Cr. @ Trout Gulch	2010	10	448	345	5,212		0.42	0
A12	Valencia C. @ Trout Gulch	2011	6	214	155	1,922		0.36	<0.01
A122	Valencia C. above School	2008	15	243	46	1,638		0.23	0.03
A122	Valencia C. above School	2009	11	204	114	1,839		0.26	0.01
A122	Valencia C. above School	2010	10	381	252	3,373		0.25	0
A122	Valencia C. above School	2011	6	491	112	2,356		0.26	<0.01
A2	Aptos C. @ Valencia C.	2008	27	46	12	683	72	0.06	0.01
A2	Aptos C. @ Valencia C.	2009	25	55	45	1,343	73	0.03	0.01
A2	Aptos C. @ Valencia C.	2010	23	93	58	1,551		0.03	0
A2	Aptos C. @ Valencia C.	2011	10	48	46	622		0.08	<0.01

Figure 6 provides a graphical context for the Enterococcus results presented in Table 2. Note that results from Trout Gulch were excluded from this graphic because these results were outliers and made graphical presentation difficult. The standard of 104 mpn Enterococcus / 100mL is also presented in this graph. The majority of results exceed the standard, and increase between 2008 and 2010, falling in 2011 to levels slightly above 2008.

Figure 5 - Enterococcus Geometric Mean by Year

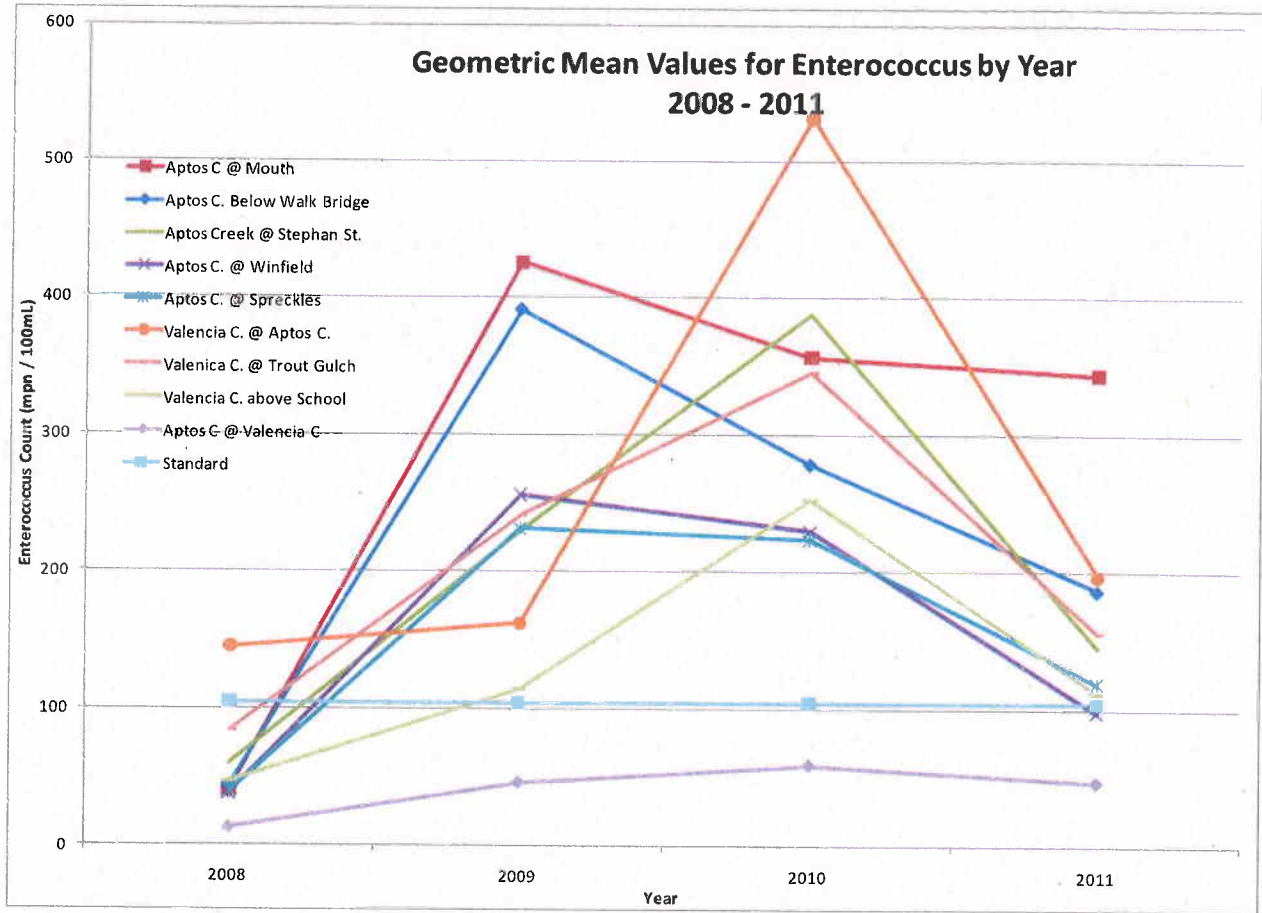
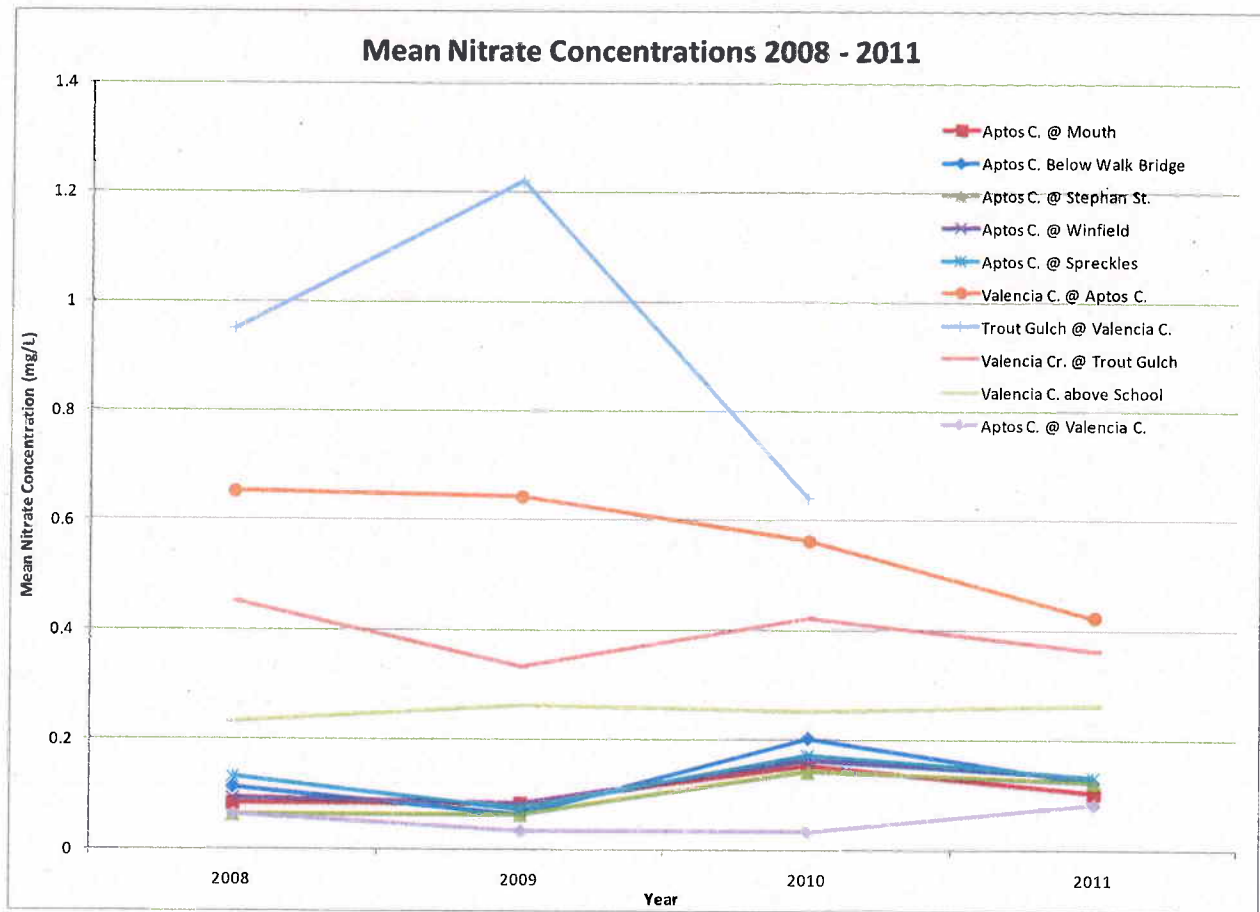


Figure 7 provides a graphical representation of mean nitrate concentrations, Trout Gulch is an obvious outlier, with the majority of sample results below 0.20 mg/L, which also may be partially responsible for the elevated levels in Valencia Creek. No standard exists for nitrate; however the Central Coast Regional Water Quality Control Board uses 1.0 mg/L as an advisory criterion.

Figure 6 - Mean Nitrate Concentration by Year



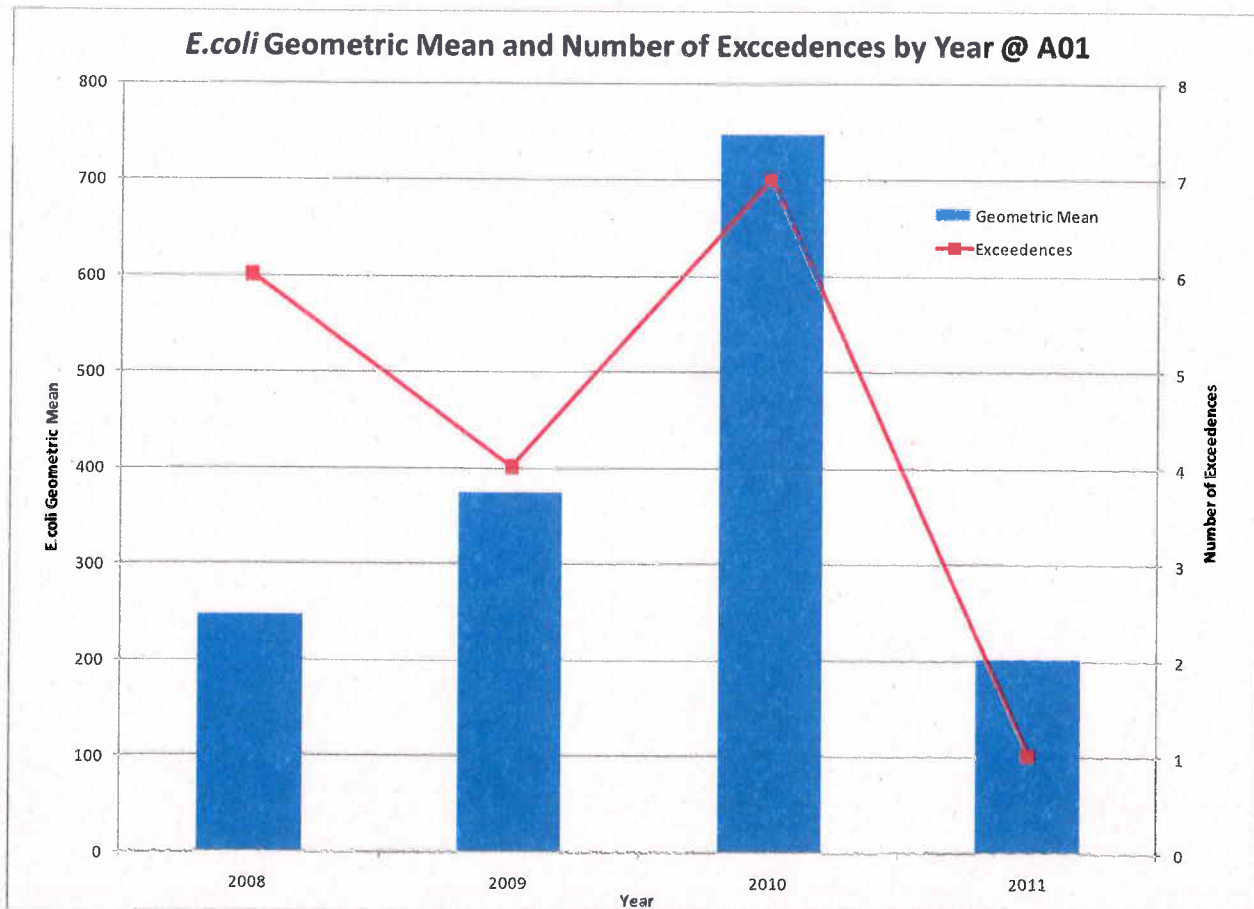
Fecal Indicator Bacteria (FIB) are common to many sources including dogs, cats, rodents and humans. Human specific bacteroides was analyzed to distinguish between human and other sources. Bacteroides are bacteria found in the guts of warm-blooded animals, and genetic markers can be applied to distinguish between human and other sources. This analysis was done using an Applied Biosystems Step One Real-Time PCR System. A summary of results from various stations in the San Lorenzo River watershed and Soquel Creek are also included in Table 3 for comparison. Note that none of the 2011 samples tested positive for human-specific bacteroides.

Table 3 - Summary of Bacteroides Results

Station	LOCATION	Year	Samples	Detections	Average Detection
A0	Aptos Creek @ Mouth	2008	9	1	38.4
A0	Aptos Creek @ Mouth	2009	9	3	169.4
A0	Aptos Creek @ Mouth	2010	12	6	40.6
A0	Aptos Creek @ Mouth	2011	5	0	0
A03	Aptos Creek @ Spreckles Dr.	2008	9	0	0
A03	Aptos Creek @ Spreckles Dr.	2009	10	5	12.36
A03	Aptos Creek @ Spreckles Dr.	2010	11	4	52.88
A03	Aptos Creek @ Spreckles Dr.	2011	6	0	0
A11	Trout Gulch	2008-10	4	3	938.30
A11	Trout Gulch	2011	1	0	0
S0	Soquel Creek at Mouth	2008-10	17	5	31.88
Various	San Lorenzo Watershed	2008-10	17	8	60.64

Figure 7 displays the geometric mean for *E.coli* and the number of time sample results exceeded the water quality standard of 400 mpn / 100 mL at station A01.

Figure 7 - *E.coli* Geometric Mean and Number of Exceedences by Year



7.0 Discussion

Identifying statistically significant water quality trends is challenging and attributing any trends to management efforts is difficult. This is due in large part to the temporal and geographic variability inherent in this type of sampling, and because management efforts are usually small in scale compared to the larger systems they occupy and the stressors upon those systems. Nevertheless, ongoing monitoring for trends and targeted studies combined with careful analysis can begin to paint a picture of whether or not water quality is improving. Often, it is the case that numerous sources are contributing bacteria via several transport mechanisms to receiving waters. It is necessary to take an incremental approach to understanding impacts, implementing projects and evaluating results. A prudent approach includes identifying the most likely sources, addressing them, and then moving to target the next-likely source. Ideally, over time, ongoing monitoring should show changes in environmental condition resulting from this incremental approach.

The data continue to indicate elevated levels of indicator bacteria in Aptos Creek. Despite elevated levels in the creek, there were no beach postings between 2009 and 2011 at either Rio del Mar (station O110) or Seacliff State Beaches (station O140). Bacteria levels are highest at the creek mouth (A00) and generally decline as you go further upstream. The high number of birds consistently observed in the river's lagoon may account for some of this trend. This theory is supported by the fact that prior testing using ribotyping indicated a significant source of bird contamination in Aptos Creek at the mouth.

It is worth noting that bacteria counts in Aptos Creek were relatively low, but increased between 2008 and 2010 before decreasing in 2011. The amount of flow in the creek when each sample was collected may be one factor influencing the results.

Prolonged precipitation will increase groundwater elevations, and as this happens, shallow groundwater can come into contact with pollutants associated with leaking or damaged sewer lines and septic systems. Additionally, rainfall will mobilize contaminants collected on the ground surface during the dry months. As more precipitation falls, more runoff is generated, and generally more pollutants are carried to surface waters as a result. However, at a certain point—with enough rainfall and runoff—pollutants may become diluted and concentrations may decrease.

We generally know that 2008 and 2009 were dry years, and 2011 was a particularly wet year. Aptos Creek is not gauged, but flow records from the adjacent watershed (Soquel Creek) can be useful in a qualitative discussion about the influence that flow conditions may have had on bacterial sample results. To investigate this, we compiled the average daily flow from Soquel Creek each day that we sampled for water quality. We calculated the geometric mean of the bacteria results for each year and calculated the average flow on the sample days during that year. (We used geometric mean for the bacterial results because the data is not normally distributed, and thus an arithmetic mean is not appropriate for that data). Table 2 displays these results. Data indicate that flow in 2011 was greater than in other years, and this supports the idea that dilution may have played a factor in these results.

Table 4 - Geometric mean *E.coli* and average flow by year

Year	GeoMean <i>E.coli</i> @ A01	Average Flow (cfs)
2008	246	16
2009	373	10
2010	747	20
2011	200	28

While dilution may account for the decrease in bacteria counts between 2010 and 2011, we cannot rule out that the decrease in bacteria could be a result of project implementation. Regardless, additional monitoring would be needed to verify this conclusion.

Valencia Creek (station A122) and Trout Gulch (station A11) both have high levels of indicator bacteria and elevated levels of nitrate. Nitrate values in the County are generally low, and our experience tells us that when higher concentrations of nitrate are observed there is usually a source in close proximity to the sampling station. Since residences on Trout Gulch and Valencia Creek are on septic systems, we assume that they may be the cause of these high results. In fact, staff observed a failing septic system along Trout Gulch. The residence was red-tagged by the County and has since been vacated.

Human specific bacteroides were detected with the highest percentage occurring in Trout Gulch between 2008 and 2010, when three of four samples tested positive. Not only did three of four of the Trout Gulch samples test positive for human specific bacteroides, one test had a considerably high result. (See Table 3 for a list of all results). For perspective, these results can be compared to various sample results from the San Lorenzo River and Soquel Creek watersheds, where nearly half to one-third of the samples tested positive for human specific bacteroides, respectively. None of the 2011 samples tested positive for human specific bacteroides. Based on these results, some inference could be made that the project reduced the human component of indicator bacteria, however additional and ongoing monitoring would be needed to support such a conclusion. We recommend that more work be done in Trout Gulch to identify and eliminate potential sources of bacteria.

The relative concentrations between stations of indicator bacteria, nitrate and ammonia concentrations are useful in assessing potential sources of contamination to the Aptos Creek Lagoon. Additional statistical analysis using an Excel macro that performs a Mann-Kendall test for trends was performed to identify any statistically significant trends. Mann-Kendall is used for non-parametric (i.e. not normally distributed) data, and the test incorporates seasonality so that results are compared month to month (i.e. January to January). The only significant trends identified were slightly increasing trends for *E.coli* at stations A03 and A00 for the months of June and May, respectively. All other results were not significant, however they generally indicated decreasing concentrations of indicator bacteria and nitrate.

In summary, sewer improvements were successfully completed in the Aptos Esplanade and Valencia Creek areas. Given the monitoring results, it is difficult to identify any changes in water quality conditions directly resulting from the project's implementation. Nevertheless, by removing one more potential source of bacteria and identifying areas where future work should be focused, this project moves us one step closer to knowing how to address bacterial contamination in Rio del Mar Beach and Seacliff State Beaches.

Appendix C – PHOTOS



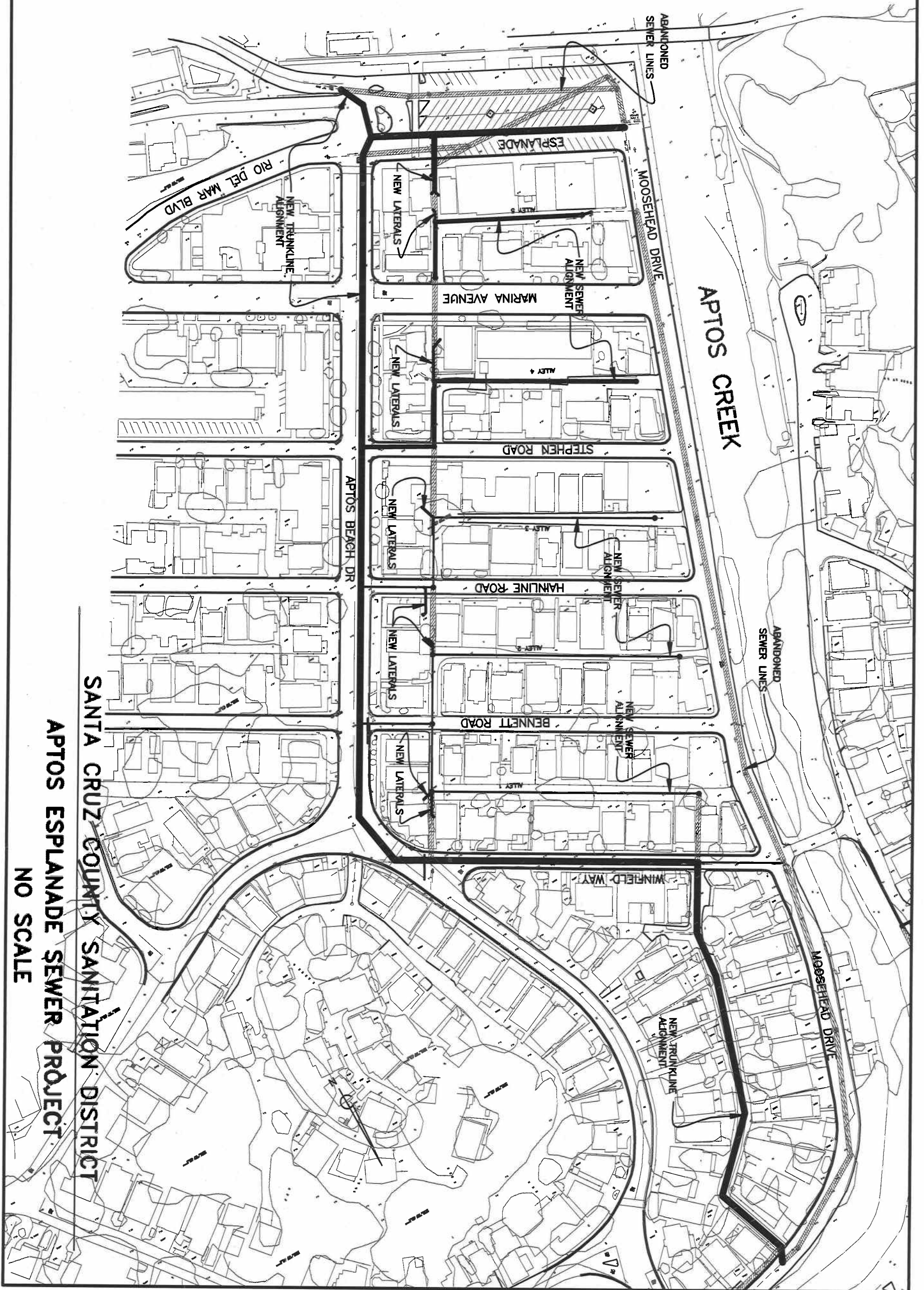
Top Left: Digging trenches for new transmission line. Top Right: Installing manholes. Bottom Left: Installing pipe. Bottom Middle: Installing pipe. Bottom Right: Construction site.



Top Left: Installing manhole covers. Top Right: Installed manhole covers. Bottom Left: Construction site after repaving. Bottom Right: Repaving construction site.

APPENDIX D
Map of Sewer Connections

MONTEREY BAY



SANTA CRUZ COUNTY SANITATION DISTRICT

APTOS ESPLANADE SEWER PROJECT

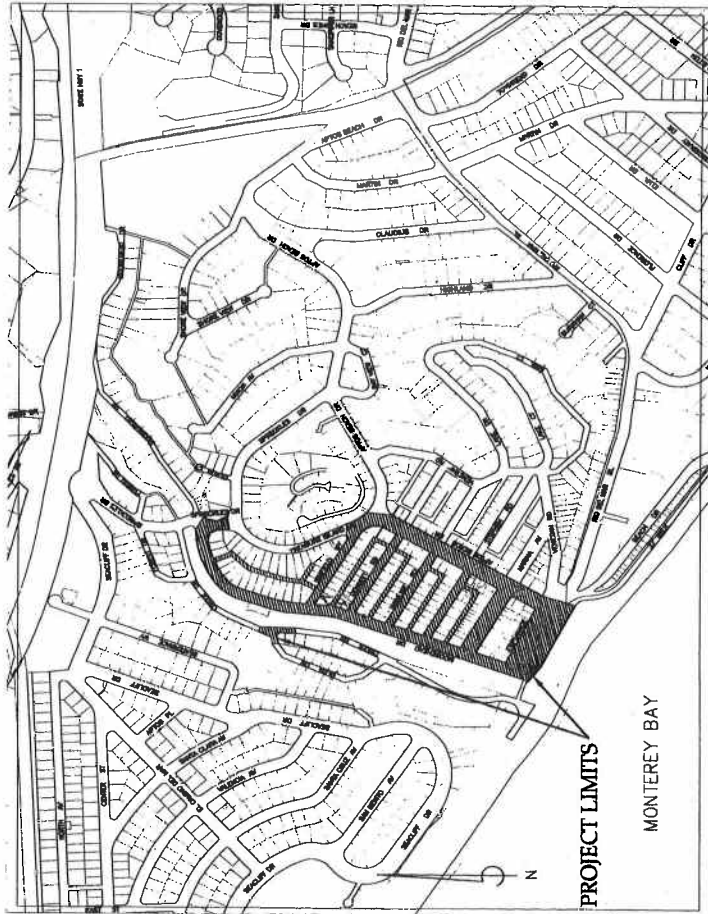
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APPENDIX E
As-Built Drawings

SANTA CRUZ COUNTY SANITATION DISTRICT

PROJECT PLANS FOR CONSTRUCTION OF APTOS ESPLANADE SEWER PROJECT

To be supplemented by Standard Plans dated May, 2006



VICINITY MAP
NOT TO SCALE

INDEX OF SHEETS:

- 1 TITLE SHEET
- 2 ESPLANADE PLAN & PROFILE
- 3 APTOS BEACH DRIVE PLAN & PROFILE 1
- 4 APTOS BEACH DRIVE PLAN & PROFILE 2
- 5 WINFIELD WAY PLAN & PROFILE
- 6 ALLEY 6 PLAN & PROFILE
- 7 ALLEY 2 PLAN & PROFILE / MANHOLE DETAIL
- 8 ALLEY 1 PLAN & PROFILE
- 9 ALLEY 3 PLAN & PROFILE
- 10 ALLEY 4 PLAN & PROFILE
- 11 ALLEY 5 PLAN & PROFILE / DROP CONNECTION DETAILS
- 12 MOOSEHEAD DRIVE SEWER ABANDONMENT
- 13 CREEK DRIVE ACCESS
- 14 CREEK DRIVE PLAN & PROFILE / TRENCH DETAILS
- 15 TRAFFIC CONTROL PLAN

- ABBREVIATIONS:**
- AB AGGREGATE BASE
 - AC ASPHALT CONCRETE
 - ACD APPROX
 - ACP APPROXIMATE
 - CS CURB & GUTTER
 - CM CORRUGATED METAL PIPE
 - CO CLEAN OUT
 - CON CONCRETE
 - CONSTR CONSTRUCTION
 - DIV DRIVEWAY
 - E EAST
 - EL ELECTRICAL
 - EP ELECTRICAL OVERHEAD
 - EP EDGE OF PAVEMENT
 - ETW EDGE OF TRAVELED WAY
 - FIN FINISH
 - FAS FASCIAN
 - FACE OF CURB
 - G GAS
 - H HORIZONTAL
 - HDPE HIGH DENSITY POLYETHYLENE
 - HTD HYDRO
 - HTD HYDRO
 - ID INSIDE DIAMETER
 - IP INSIDE DIAMETER
 - JT JOINT POLE
 - L LATERAL
 - MB METER BOX
 - MH MANHOLE
 - NIC NOT IN CONTRACT
 - OD OUTSIDE DIAMETER
 - OH OVERHEAD
 - PVC POLYVINYL CHLORIDE
 - RIM MANHOLE RIM ELEVATION
 - RCP REINFORCED CONCRETE PIPE
 - S SOUTH
 - SDI SOFT DRIP
 - SDI STORM DRAIN OR RAINAGE INLET
 - SMR SANITARY SEWER
 - STA STATION
 - T TELEPHONE
 - TV TELEVISION CABLE
 - V VERTICAL
 - VCP VITRIFIED CLAY PIPE
 - W WATER
 - WM WEST
 - WM WATER METER

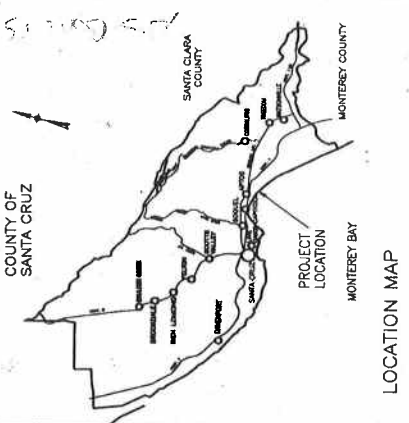
GENERAL NOTES:

1. ALL CONSTRUCTION SHALL CONFORM TO THE COUNTY OF SANTA CRUZ DESIGN CRITERIA, THE 2006 STATE STANDARD PLANS AND THE APPLICABLE PROVISIONS OF THE 2006 STATE STANDARD SPECIFICATIONS.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE COUNTY OF SANTA CRUZ AND THE SANITATION DISTRICT PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER IN CASE OF ANY CHANGES TO THE CONSTRUCTION PLANS OR SPECIAL PROVISIONS SHALL BE MADE WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE COUNTY OF SANTA CRUZ AND THE SANITATION DISTRICT PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER IN CASE OF ANY CHANGES TO THE CONSTRUCTION PLANS OR SPECIAL PROVISIONS SHALL BE MADE WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER.
4. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THE LOCATIONS AND DEPTHS OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER IN CASE OF ANY CHANGES TO THE CONSTRUCTION PLANS OR SPECIAL PROVISIONS SHALL BE MADE WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER.
5. THE CONTRACTOR SHALL POSSESS A CLASS "A" CONTRACTOR'S LICENSE AT THE TIME OF BIDDING.

SEWER LATERAL NOTES:

1. THE LOCATIONS OF ALL SEWER LATERALS SHOWN ON THESE PLANS ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE EXACT LOCATIONS OF ALL SEWER LATERALS AND LATERAL ABANDONMENTS IN THE SPECIAL PROVISIONS.
2. ALL EXISTING SEWER LATERALS THAT ARE NOT IDENTIFIED OR STRUCTURALLY SOUND SHALL BE INSPECTED BY THE CONTRACTOR AND REPAIRED OR ABANDONED IN ACCORDANCE WITH THE SPECIAL PROVISIONS.

Reviewed by: *Scott Johnson 9/3/09* Construction Manager
 Reviewed by: *Laurie Gossel* Construction Manager
 Reviewed by: *Don Hill 9-3-09* Sanitation Operations Manager
 Reviewed by: *JACK SOHRIAKOFF* Traffic Engineer



MOUNTAIN CASCADE
AS CONSULTANTS



Prachi V. Kulkarni 9-3-09
Sanitation Engineer
Registered Civil Engineer

Don Hill 9-3-09
Assistant District Engineer
Registered Civil Engineer

Scott Johnson 9-3-09
District Engineer
Registered Civil Engineer

Paul Johnson
Chairperson of the Board
9-3-09
Plan Approval Date

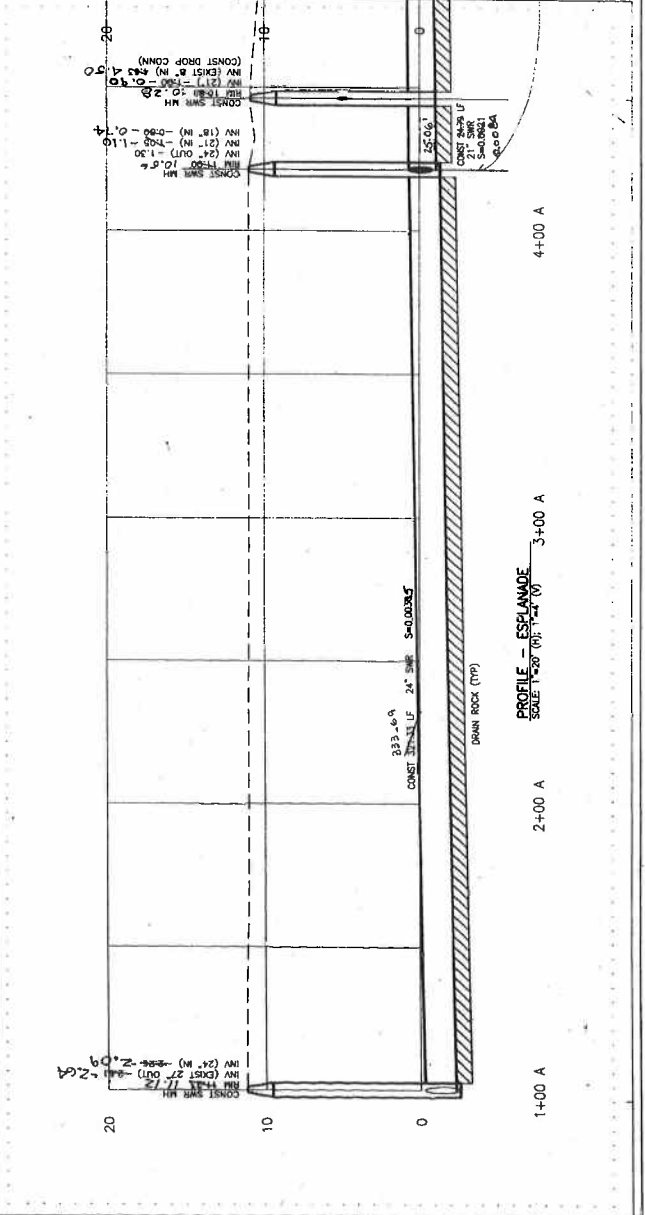
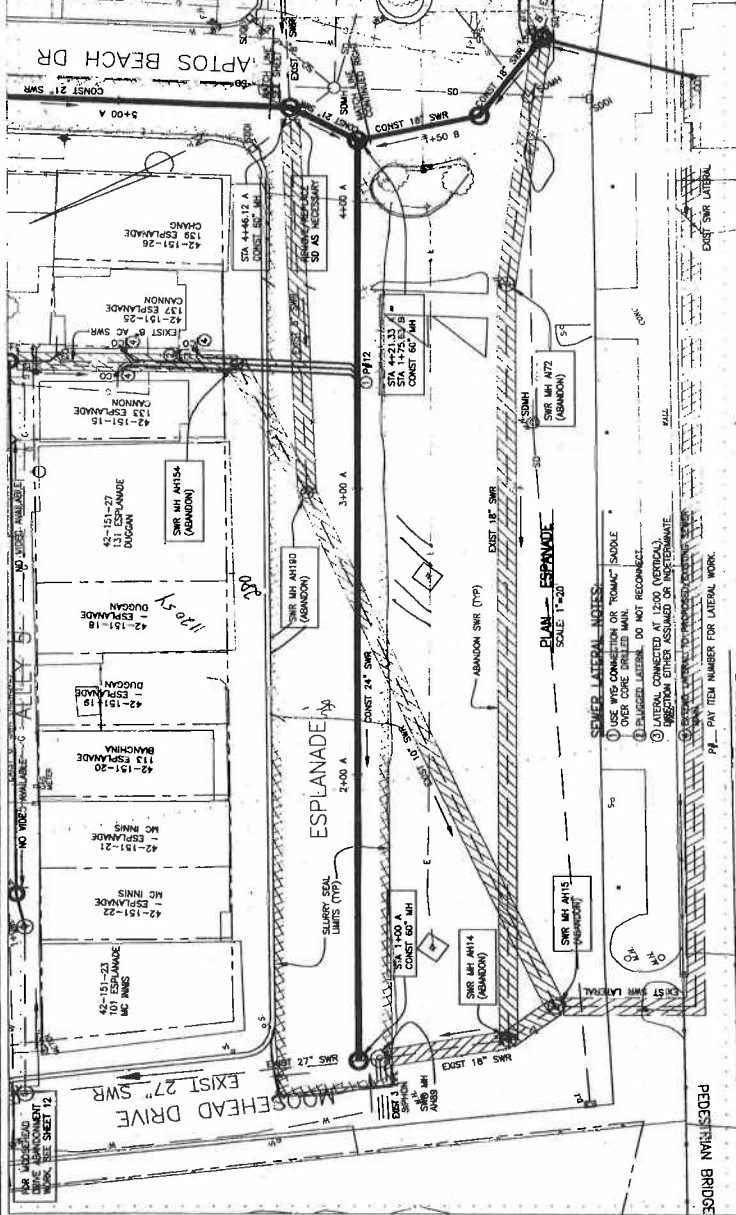
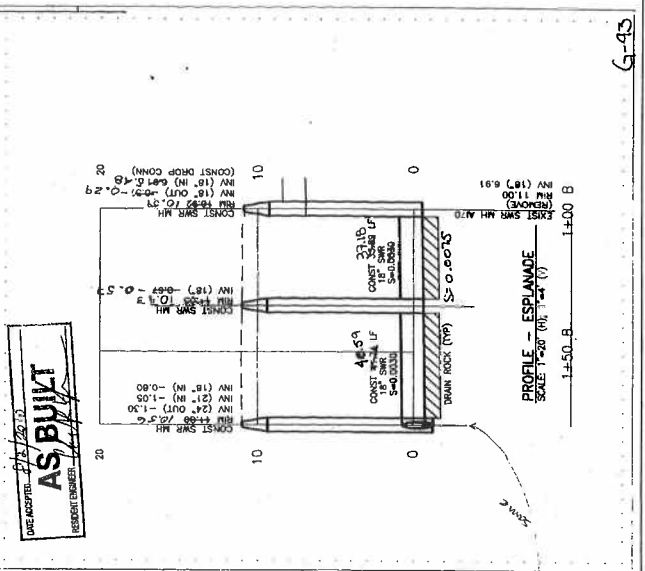
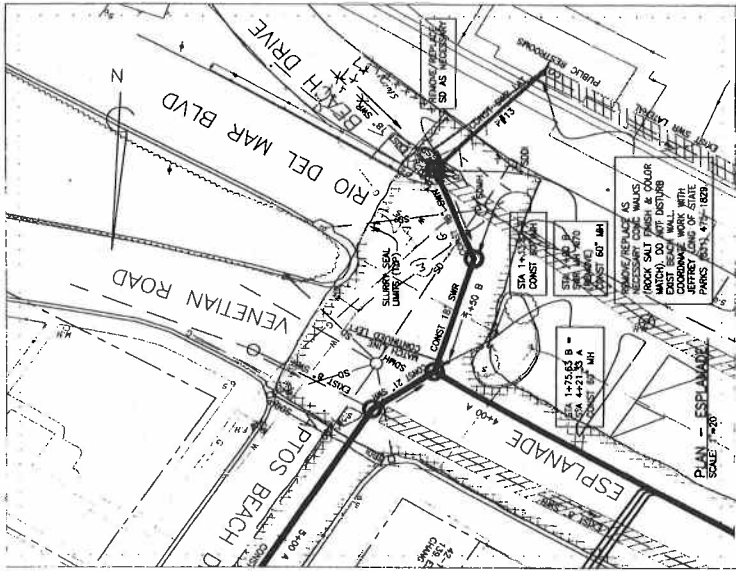
JOB NO: 55806
SHEET
1 of 14

REVISION	DATE	BY



SANTA CRUZ COUNTY SANITATION DISTRICT
APTOS ESPLANADE SEWER PROJECT
ESPLANADE PLAN & PROFILE

DRAWN: DB	CHECKED: DPW
DATE: AUG 2009	SCALE: AS SHOWN
JOB NO: 53806	SHEET
2 of 14	



AS BUILT
 DATE ACCEPTED: 11/12/07
 RESIDENT ENGINEER

SEWER LATERAL NOTES:
 1. USE WPC CONNECTION OR 'ROMAC' SHOULDER OVER CORE DRILLED HOLE.
 2. LARGER LATERAL DO NOT RECONNECT.
 3. LATERAL CONNECTED AT 1200 (VERTICAL) SECTION OTHER ASSUMED OR INTERFERE.
 4. SEE SHEET 12 FOR LATERAL NUMBER FOR LATERAL WORK.

FOR INFORMATION: NO WIRE AVAILABLE - NO TEST AVAILABLE

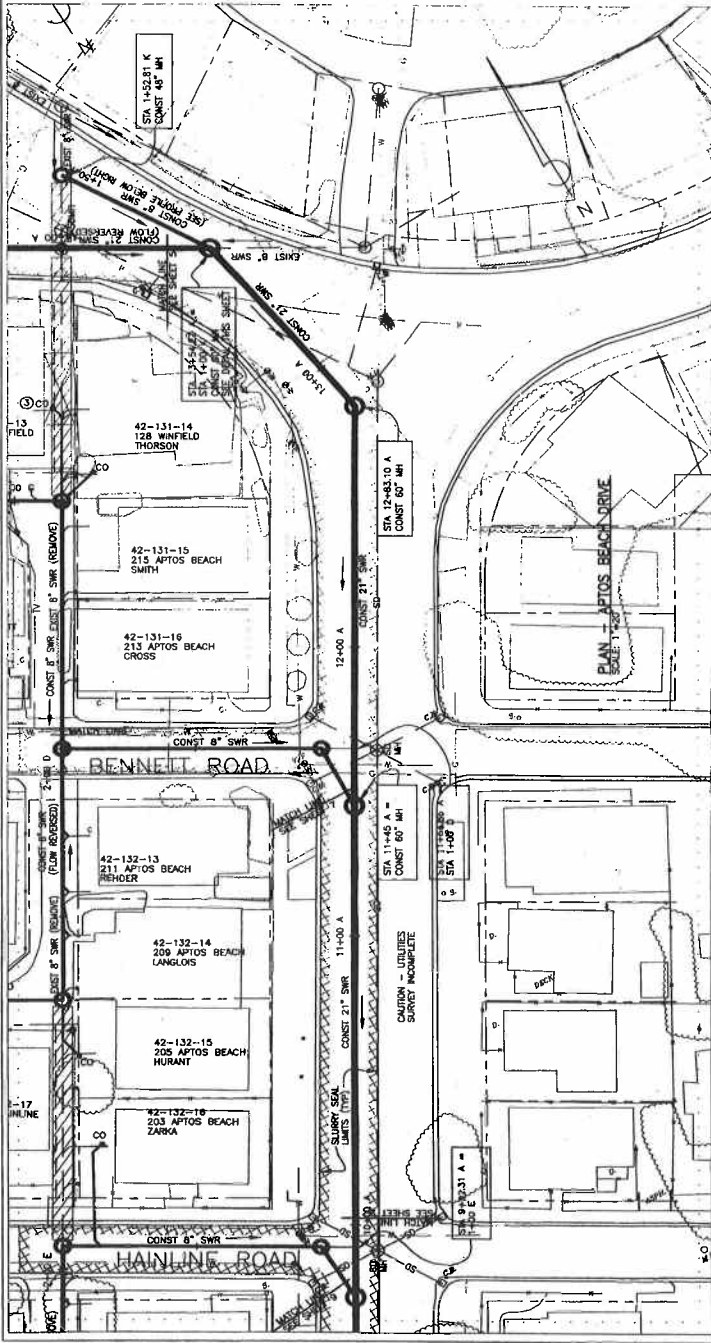
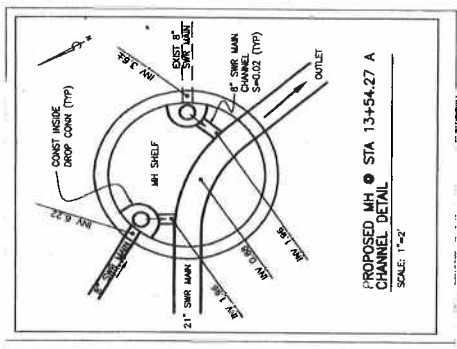
G-93

BY	REVISION	DATE

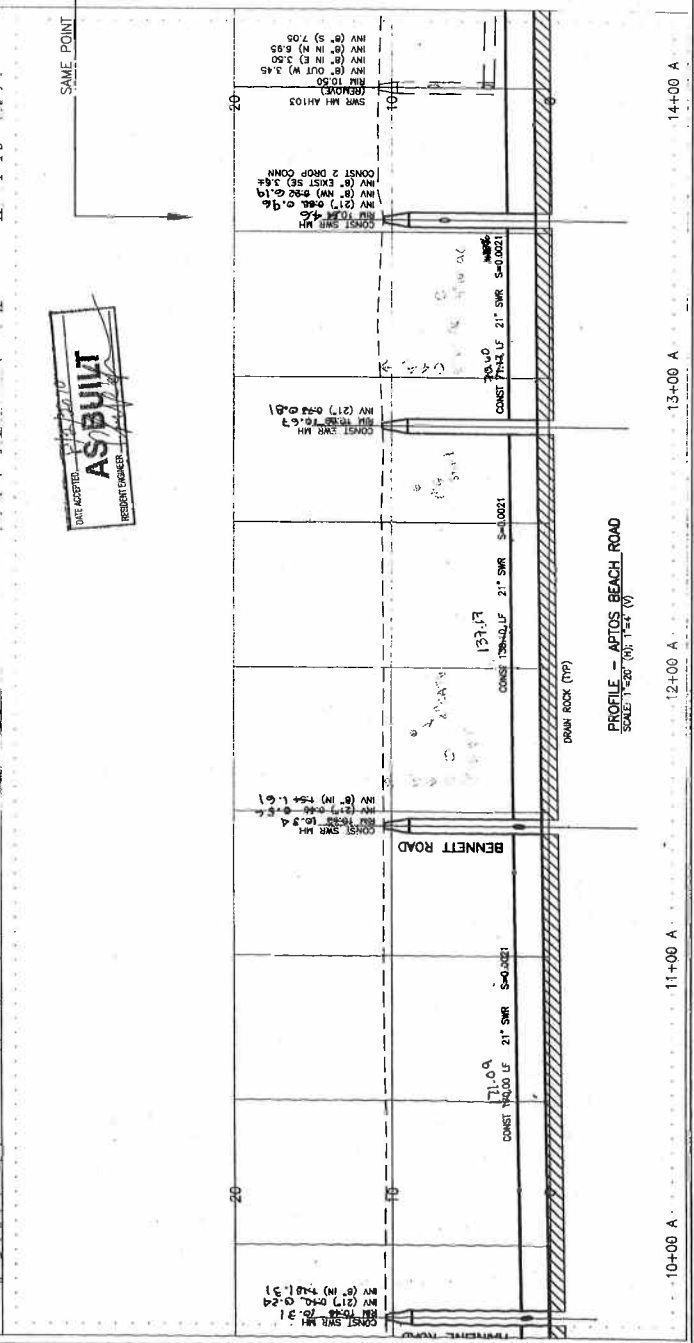
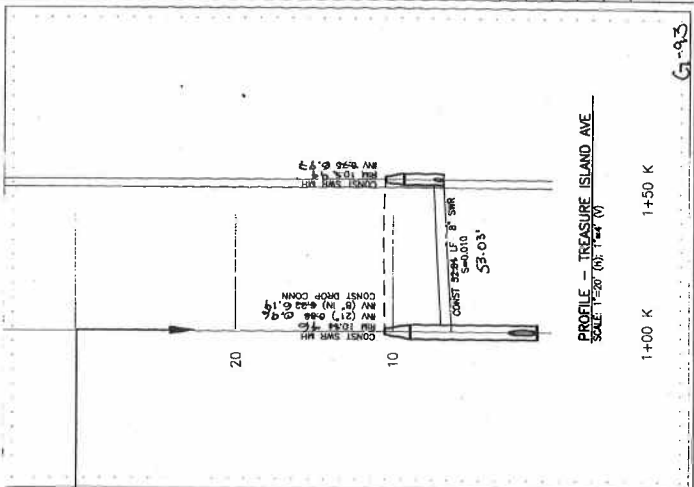


SANTA CRUZ COUNTY SANITATION DISTRICT
APTOS BEACH DRIVE PLAN & PROFILE 2

DRAWN: DB
 CHECKED: DPW
 DATE: AUG 2009
 SCALE: AS SHOWN
 JOB NO: 53806
 SHEET
4 of 14



DATE ACCEPTED: 12/14/10
AS BUILT
 RESUBMIT ENGINEER



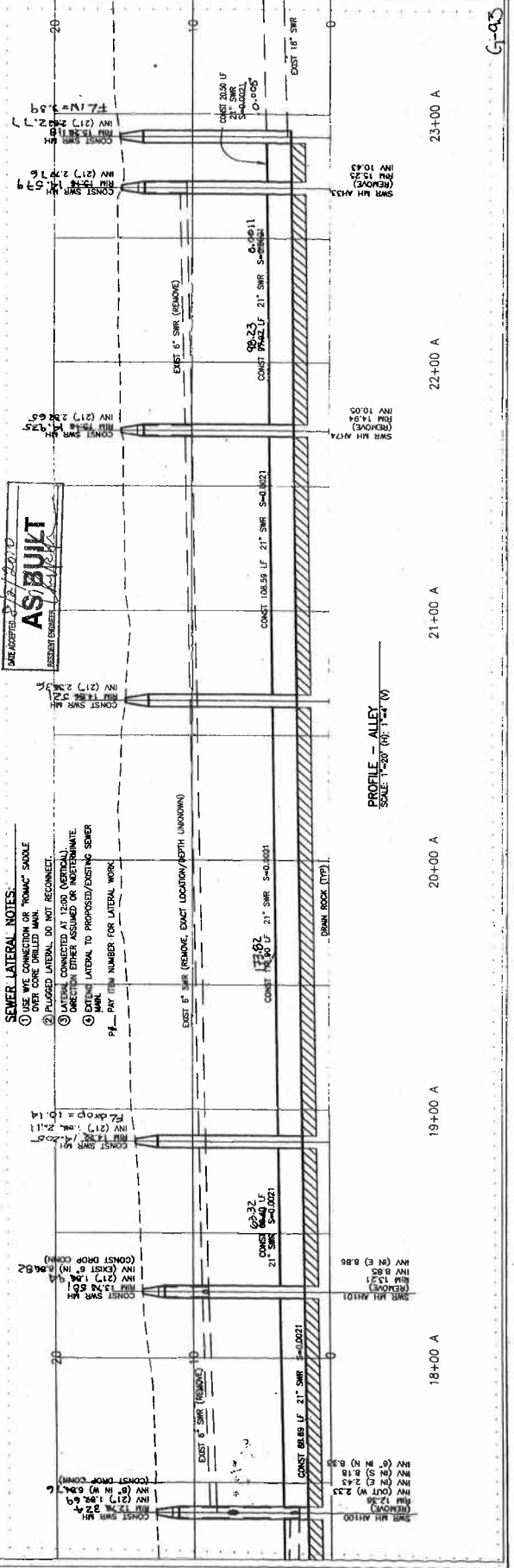
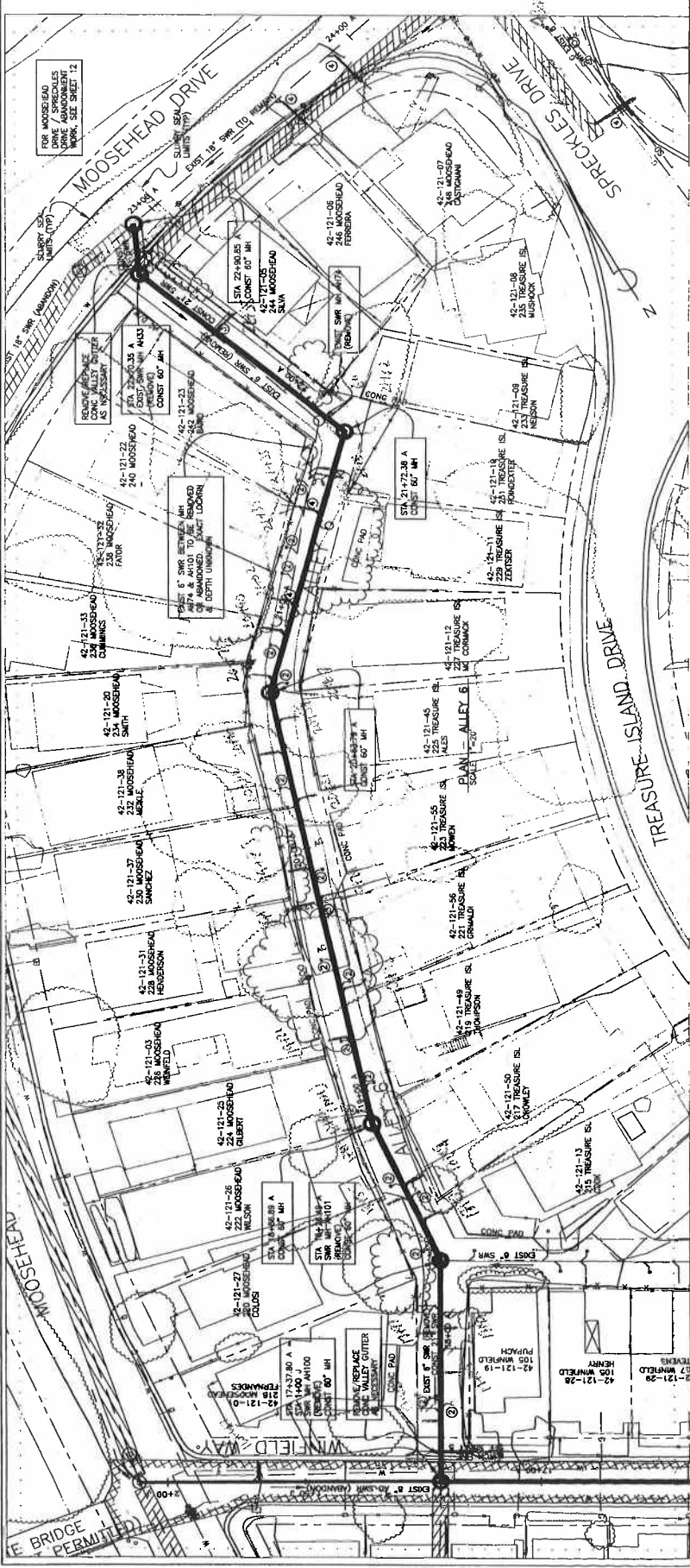
6-93

DATE	REVISION	BY



SANTA CRUZ COUNTY SANITATION DISTRICT
 ALLEY 6 PLAN & PROFILE

DRAWN: DB
 CHECKED: DPW
 DATE: AUG 2009
 SCALE: AS SHOWN
 JOB NO: 53606



- SEWER LATERAL NOTES:**
- ① USE WTC CONNECTION OR "ROMAC" SHOULDER OVER CORE DRILLED MANHOLE
 - ② PLUGGED LATERAL DO NOT RECONNECT
 - ③ LATERAL CONNECTED TO 24" VERTICAL
 - ④ EXISTING LATERAL TO PROPOSED EXISTING SEWER MANHOLE
 - ⑤ EXISTING LATERAL TO PROPOSED EXISTING SEWER MANHOLE
- PA... PAY ITEM NUMBER FOR LATERAL WORK

PROFILE - ALLEY
 SCALE: 1"=20' (VT, 1"=40' H)

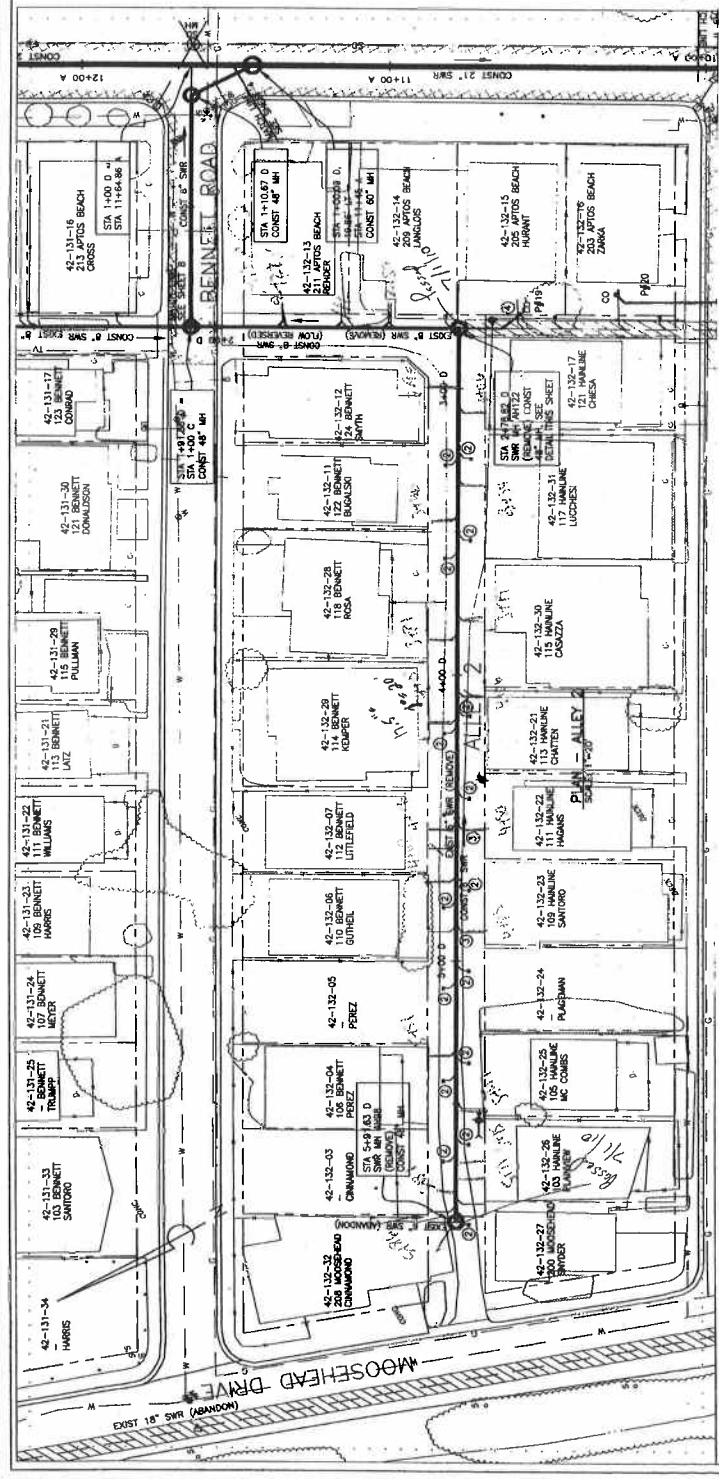
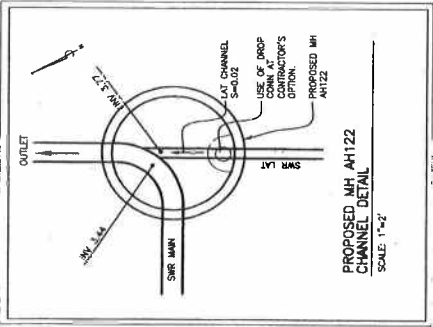
G-95

SANTA CRUZ COUNTY SANITATION DISTRICT
 APTOS ESPLANADE SEWER PROJECT
 ALLEY 2 PLAN & PROFILE

DRAWN: DB
 CHECKED: DPW
 DATE: AUG. 2009
 SCALE: AS SHOWN
 JOB NO: 53806
 SHEET
 7 of 14

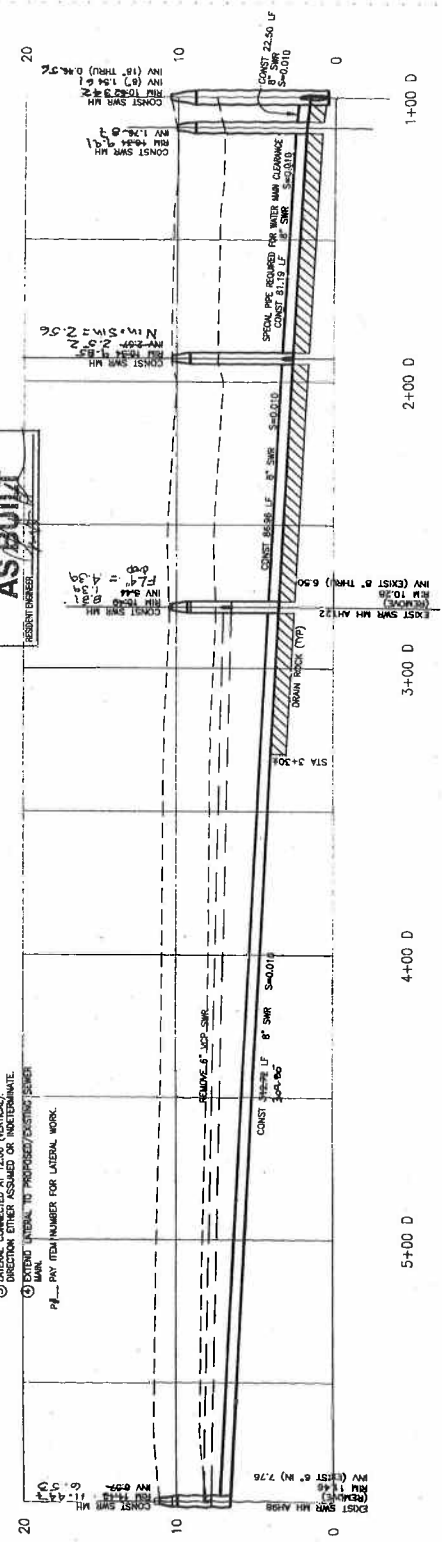


REVISION	DATE



- SEWER LATERAL NOTES:**
- ① USE WYE CONNECTION OR "ROMAIC" SADDLE OVER EXISTING LATERAL
 - ② PLUGGED LATERAL DO NOT RECONNECT
 - ③ EXTEND LATERAL TO PROPOSED/EXISTING SEWER MAN
 - ④ EXTEND LATERAL TO PROPOSED/EXISTING SEWER MAN

AS BUILT
 DATE ADAPTED: 01/15/10
 PRESENT ENGINEER

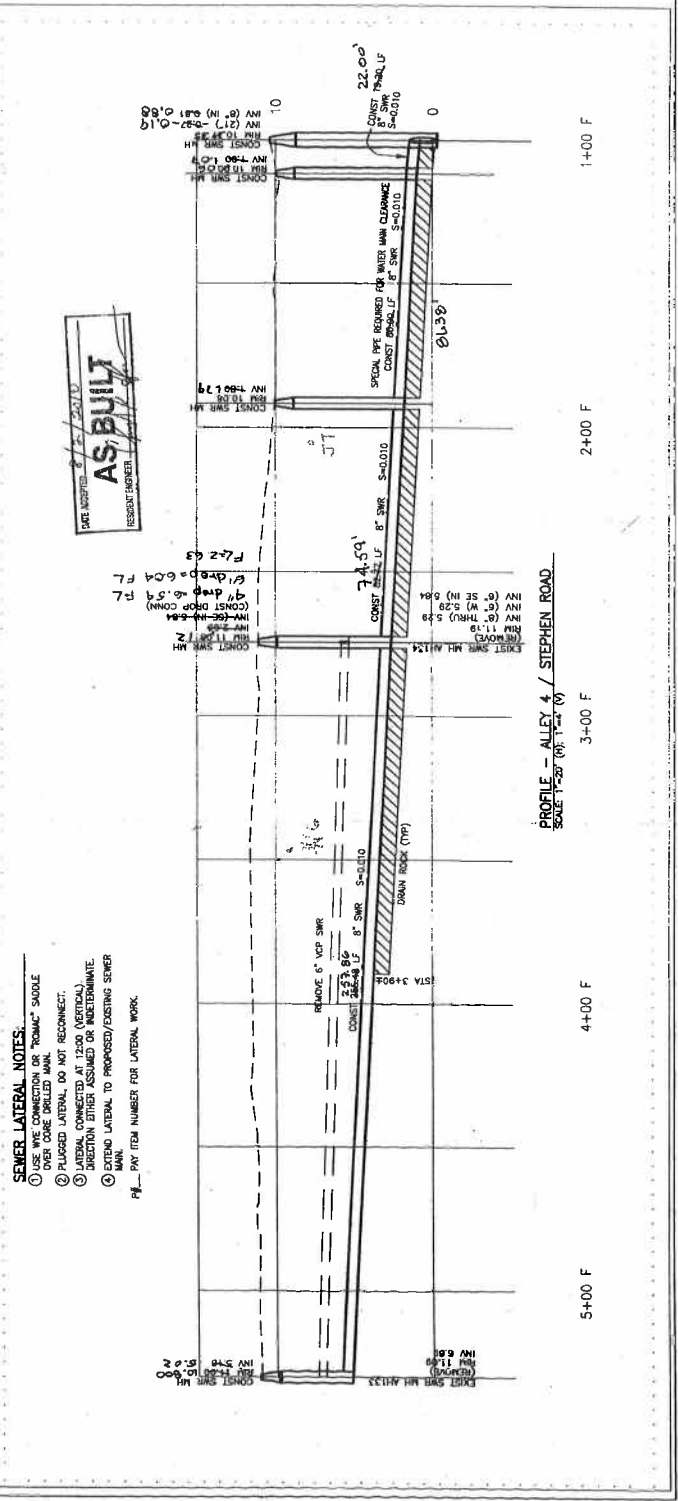
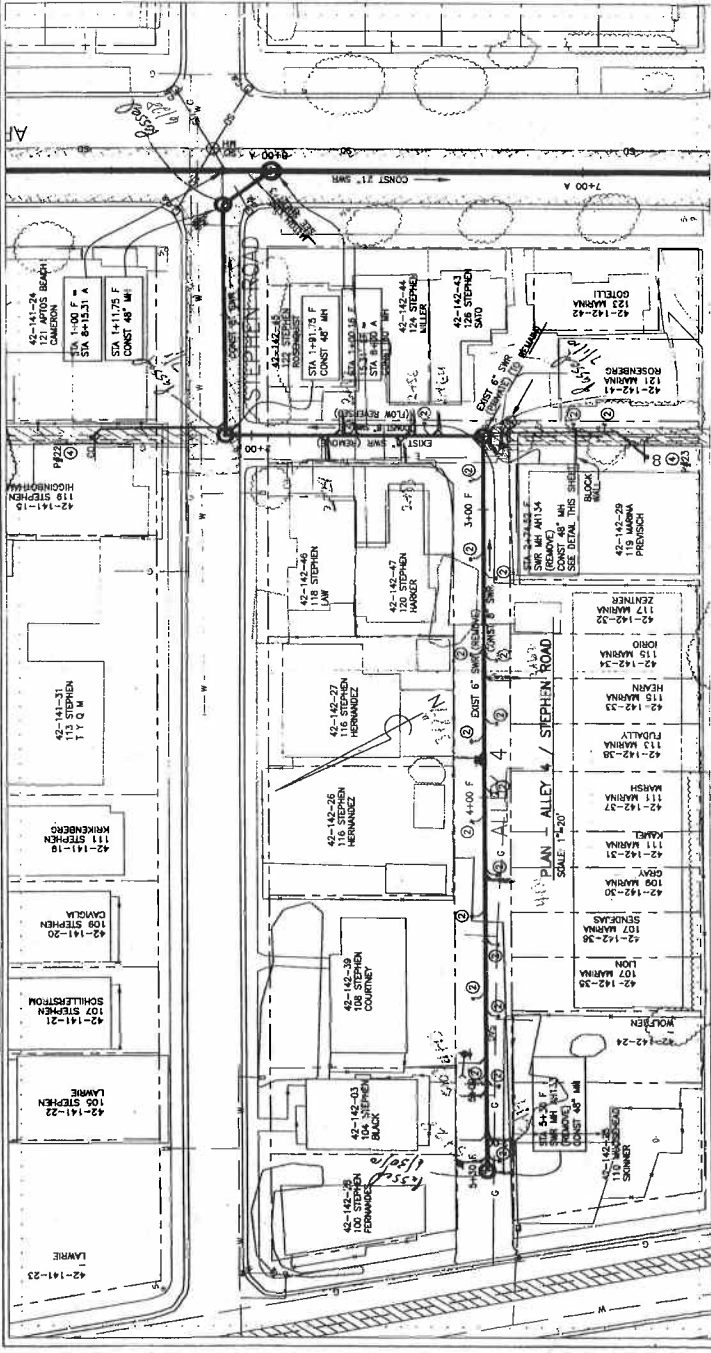
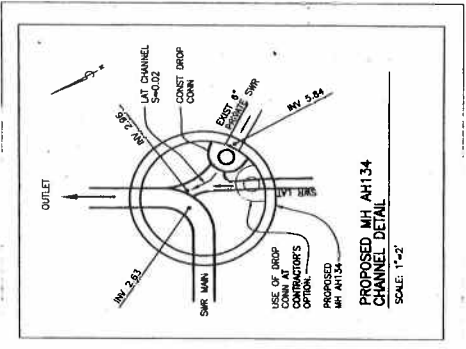


PROFILE -- ALLEY 2 / BENNETT ROAD
 SCALE 1"=20' (H), 1"=4' (V)

SANTA CRUZ COUNTY SANITATION DISTRICT
 ALLEY 4 PLAN & PROFILE

DRAWN: DB
 CHECKED: DPW
 DATE: AUG 2009
 SCALE: AS SHOWN
 JOB NO: 53806
 SHEET

DATE	REVISION	BY



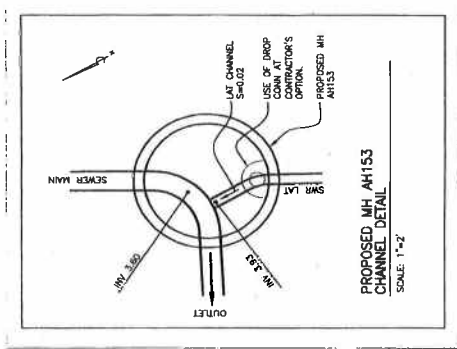
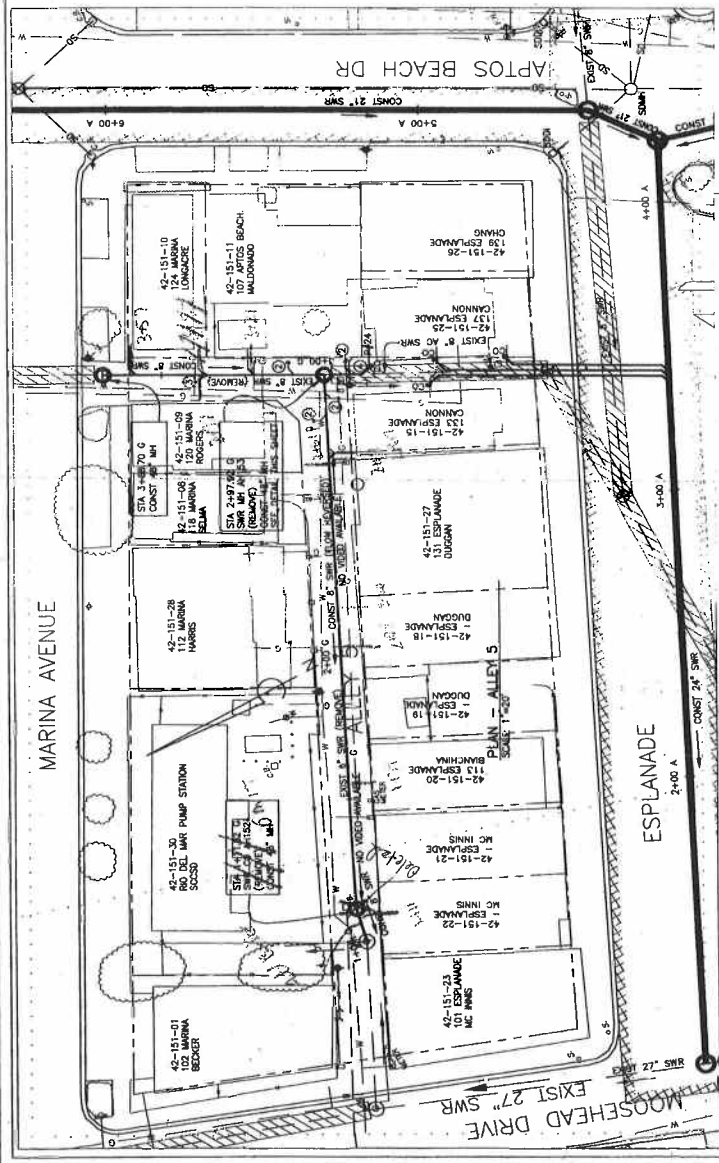
- SEWER LATERAL NOTES:**
- ① USE WYE CONNECTION OR "YOMACK" SADDLE OVER CORE DRILLED MAN.
 - ② PLUGGED LATERAL, DO NOT RECONNECT.
 - ③ LATERAL CONNECTED AT 12:00 (VERTICAL). DIRECTION EITHER ASSUMED OR INDICATED.
 - ④ EXISTING LATERAL TO PROPOSED/EXISTING SEWER.
- PK #1 PK #2M NUMBER FOR LATERAL WORK.

DATE	REVISION	BY

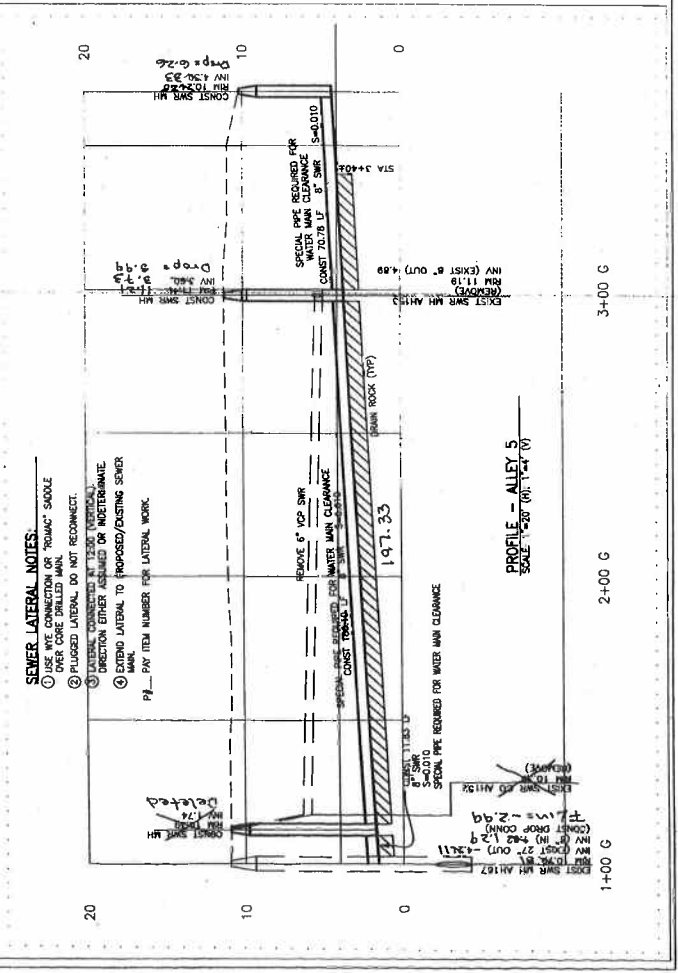
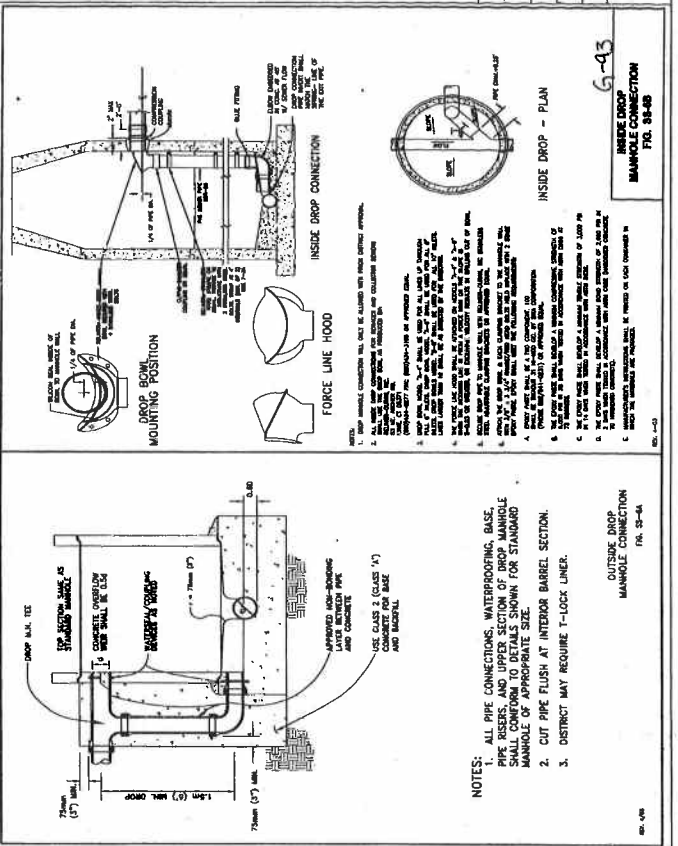


SANTA CRUZ COUNTY SANITATION DISTRICT
APTOS ESPLANADE SEWER PROJECT
 ALLEY 5 PLAN & PROFILE / DROP CONNECTION DETAILS

DRAWN: DB
 CHECKED: DFW
 DATE: AUG 2009
 SCALE: AS SHOWN
 JOB NO: 53806
 SHEET
 11 of 14



AS BUILT
 DATE ACCEPTED: 12/20/10
 DESIGNER: [Signature]



- SEWER LATERAL NOTES:**
- USE VPE CONNECTION OR "TOMMY" SHOULDER OVER CORE DRILLED MAIN.
 - PLUGGED LATERAL DO NOT RECONNECT.
 - EXTEND LATERAL TO PROPOSED/EXISTING SEWER MAIN.
 - EXTENSION ENTERED OR INTERFERE.
- PL - PAY ITEM NUMBER FOR LATERAL WORK.

PROFILE - ALLEY 5
 SCALE 1"=20' (H), 1"=4' (V)

1+00 G
 2+00 G
 3+00 G

INSIDE DROP MANHOLE CONNECTION FIG. 10-43

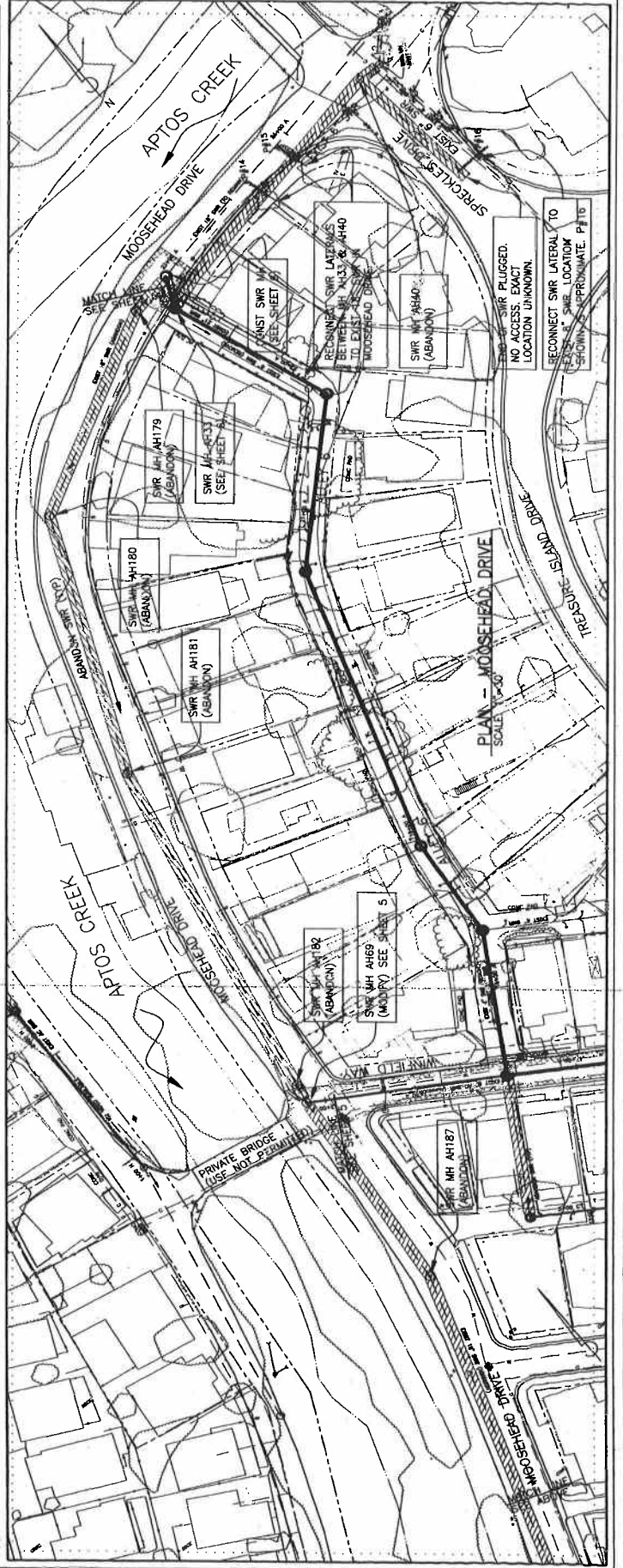
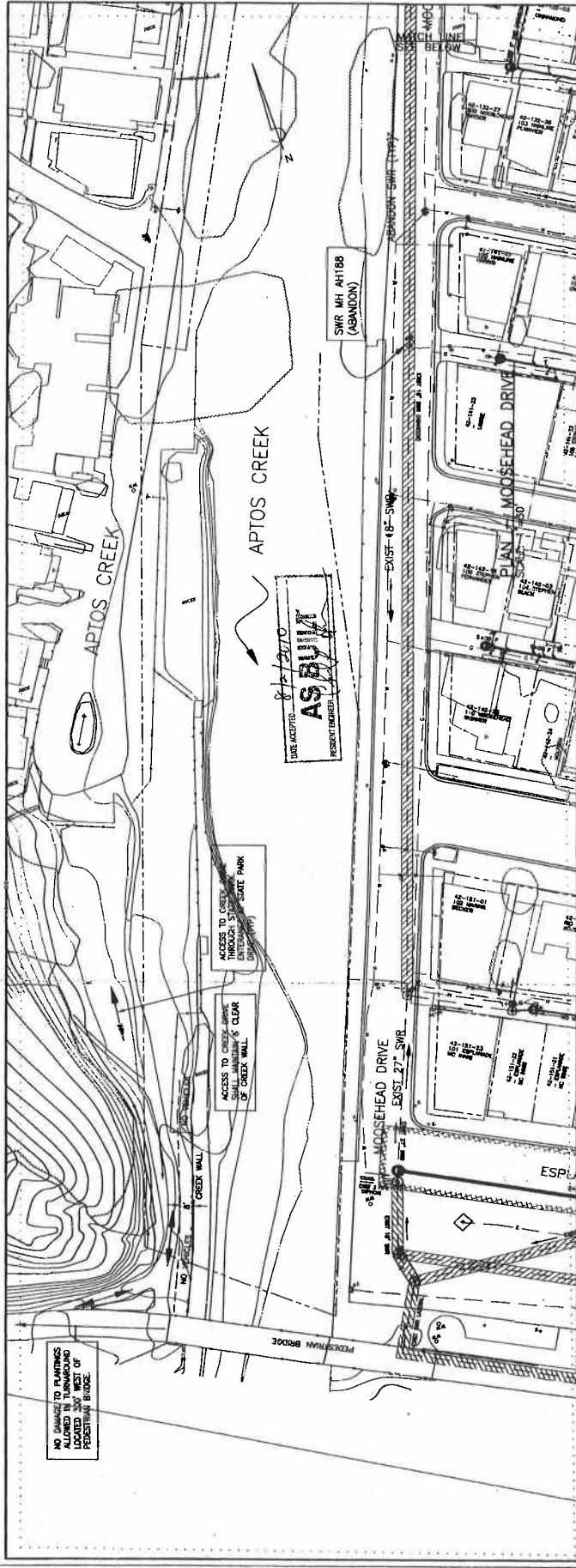
OUTSIDE DROP MANHOLE CONNECTION FIG. 10-44

DATE	REVISION	BY



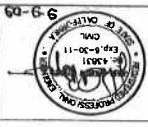
SANTA CRUZ COUNTY SANITATION DISTRICT
APTOS ESPLANADE SEWER PROJECT
MOOSEHEAD DRIVE SEWER ABANDONMENT
 CREEK DRIVE ACCESS

DRAWN: DB	CHECKED: DFW
DATE: AUG 2009	SCALE: AS SHOWN
JOB NO: 53806	SHEET
12 of 14	



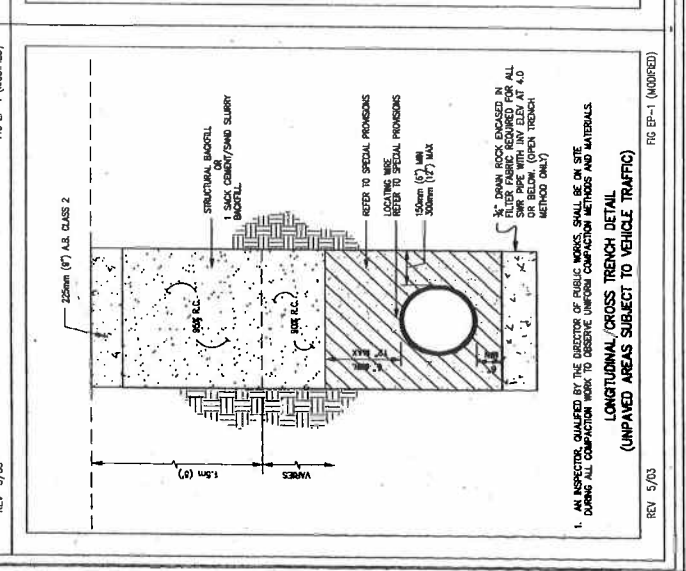
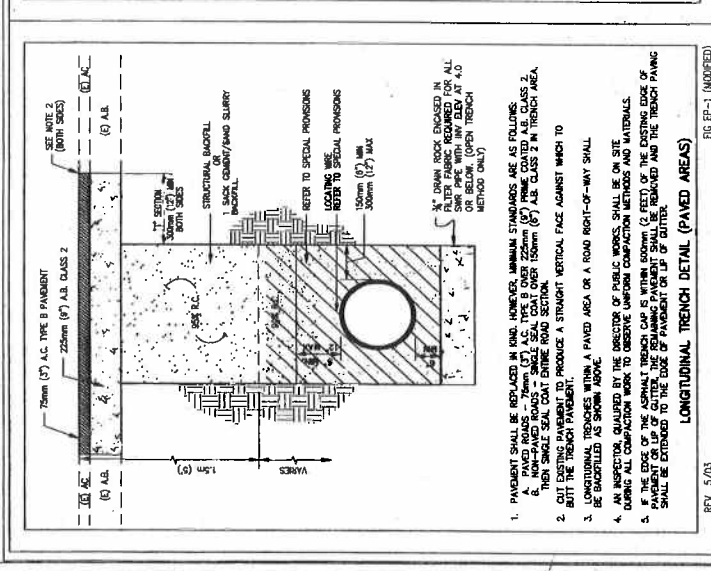
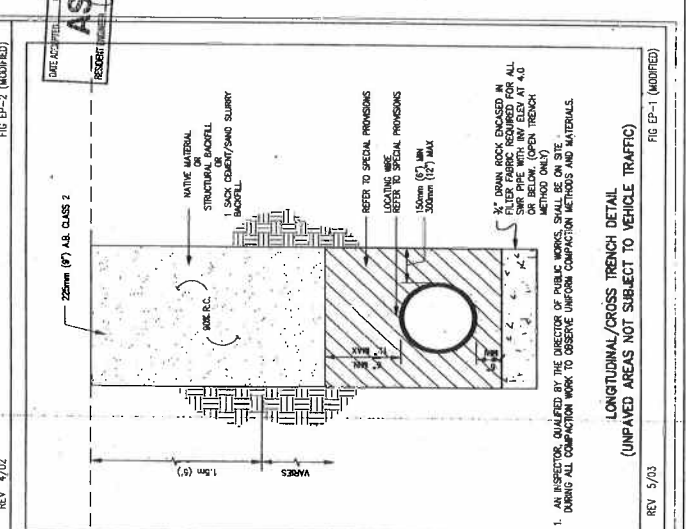
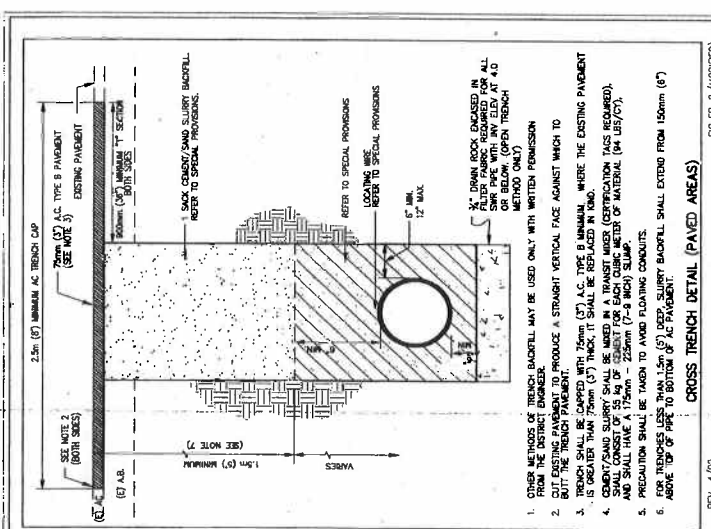
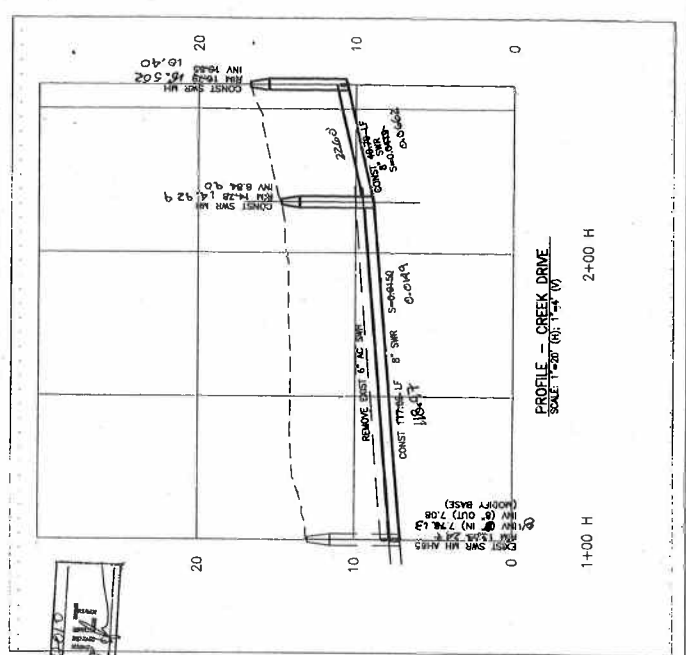
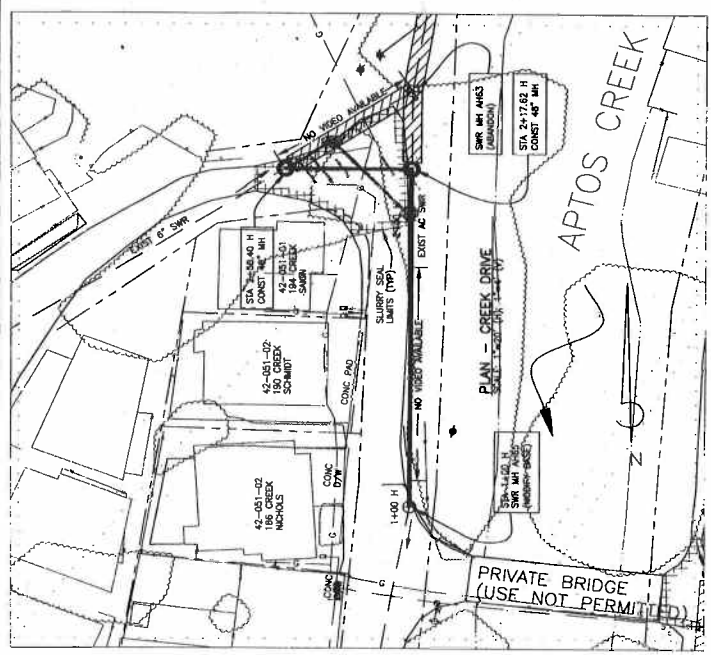
G-43

DATE	REVISION	BY



SANTA CRUZ COUNTY SANITATION DISTRICT
APTOS ESPLANADE SEWER PROJECT
CREEK DRIVE PLAN & PROFILE / TRENCH DETAILS

DRAWN: DB
 CHECKED: DFW
 DATE: AUG. 2009
 SCALE: AS SHOWN
 JOB NO: 53806
 SHEET
13 of 14



1. PAVEMENT SHALL BE REPLACED IN KIND, HOWEVER, MINIMUM STANDARDS ARE AS FOLLOWS:
 A. PAVED ROADS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE ROAD SECTION.
 B. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.
 C. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.
 D. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.
 E. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.
 F. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.
 G. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.
 H. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.
 I. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.
 J. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.
 K. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.
 L. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.
 M. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.
 N. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.
 O. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.
 P. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.
 Q. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.
 R. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.
 S. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.
 T. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.
 U. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.
 V. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.
 W. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.
 X. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.
 Y. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.
 Z. DRIVEWAYS - 75mm (3") A.C. TYPE B OVER 225mm (9") PAVEMENT COATED A.B. CLASS 2, THEN SINGLE SEAL COAT ENTIRE DRIVEWAY SECTION.

1. AN INSPECTOR, QUALIFIED BY THE DIRECTOR OF PUBLIC WORKS, SHALL BE ON SITE DURING ALL COMPACTION WORK TO OBSERVE UNIFORM COMPACTION METHODS AND MATERIALS.

G-93

OWNER'S STATEMENT

WE HEREBY STATE THAT WE ARE THE OWNERS OF OR HAVE SOME RIGHT, TITLE OR INTEREST IN AND TO THE REAL PROPERTY INCLUDED WITHIN THE SUBDIVISION SHOWN ON THIS MAP. WE ARE THE ONLY PERSONS WHOSE CONSENT IS NECESSARY TO SIGN SAID MAP PURSUANT TO SECTION 66454.5(a) OF THE SUBDIVISION MAP ACT, AND WE CONSENT TO THE MAKING OF SAID MAP AND SAID SUBDIVISION AS SHOWN WITHIN THE DISTINCT BORDER LINES.

OWNER:
GREEN VALLEY CORPORATION, A CALIFORNIA CORPORATION

BY: _____
BY: _____

TAX AND ASSESSMENT CERTIFICATE

I HEREBY CERTIFY THAT THERE ARE NO LENS FOR UNPAID STATE, COUNTY, MUNICIPAL OR LOCAL TAXES OR SPECIAL ASSESSMENTS TO ANY PART THEREOF, EXCEPT AS NOTED IN THE WITHIN SUBDIVISION OR AGAINST ANY PART THEREOF. I AM NOT AWARE OF ANY TAXES PAYABLE AND WHICH IT IS HEREBY ESTIMATED WILL NOT EXCEED THE SUM OF \$ _____ FOR THE YEAR _____, AND THAT SAID LAND IS NOT, NOR IS ANY PART THEREOF, SUBJECT TO ANY SPECIAL ASSESSMENT WHICH HAS NOT BEEN PAID IN FULL AND THAT THIS CERTIFICATE IS NOT BEING FILED FOR ASSESSMENT PURPOSES. I AM NOT AWARE OF ANY ASSESSMENTS NOT YET BECOME A LENS AGAINST SAID LAND OR ANY PART THEREOF.

DATED _____
AUTOR-CONTROLLER OF THE COUNTY OF SANTA CRUZ

BY: _____ DEPUTY

CERTIFICATE OF CLERK OF BOARD

THE CLERK OF THE BOARD OF SUPERVISORS OF THE COUNTY OF SANTA CRUZ DOES HEREBY CERTIFY THAT THE CERTIFICATE OF THE BOARD OF SUPERVISORS UNDER THE PROVISIONS OF SECTIONS 66492 AND 66493 OF THE GOVERNMENT CODE HAS BEEN FULLY AND CORRECTLY FILED WITH THE CLERK OF THE COUNTY OF SANTA CRUZ PURSUANT TO THE AUTHORITY DELEGATED TO ME BY SAID BOARD. I HEREBY APPROVE SAID CERTIFICATES AND SECURITIES ON BEHALF OF THE COUNTY OF SANTA CRUZ.

CLERK OF THE BOARD OF SUPERVISORS

BY: _____ DEPUTY CLERK
DATE: _____

OWNER'S ACKNOWLEDGEMENT

STATE OF CALIFORNIA
COUNTY OF SANTA CRUZ
S.S.
ON _____ PERSONALLY APPEARED _____ AND
PROVED TO ME ON THE BASIS OF SATISFACTORY EVIDENCE TO BE THE PERSON(S) WHOSE NAME(S) IS/ARE SUBSCRIBED TO THE WITHIN INSTRUMENT AND ACKNOWLEDGED TO ME THAT HE/SHE/HEY EXECUTED THE SAME IN HIS/HER/THEIR AUTHORIZED CAPACITY(IES); AND THAT BY HIS/HER/THEIR SIGNATURE(S) ON THE INSTRUMENT THE PERSON(S), OR THE ENTITY UPON BEHALF OF WHICH THE PERSON(S) ACTED, EXECUTED THE INSTRUMENT.

I CERTIFY UNDER PENALTY OF PERJURY UNDER THE LAWS OF THE STATE OF CALIFORNIA THAT THE FOREGOING PARAGRAPH IS TRUE AND CORRECT.

WITNESS MY HAND AND OFFICIAL SEAL
NOTARY'S SIGNATURE _____
PRINTED NOTARY'S NAME _____
COMMISSION NO. _____

BENEFICIARY ACKNOWLEDGEMENT

STATE OF CALIFORNIA
COUNTY OF SANTA CRUZ
S.S.
ON _____ 2011 BEFORE ME, THE UNDERSIGNED, A NOTARY PUBLIC IN AND FOR SAID STATE, PERSONALLY APPEARED _____
PROVED TO ME ON THE BASIS OF SATISFACTORY EVIDENCE TO BE THE PERSON(S) WHOSE NAME(S) IS/ARE SUBSCRIBED TO THE WITHIN INSTRUMENT AND ACKNOWLEDGED TO ME THAT HE/SHE/HEY EXECUTED THE SAME IN HIS/HER/THEIR AUTHORIZED CAPACITY(IES), AND THAT BY HIS/HER/THEIR SIGNATURE(S) ON THE INSTRUMENT THE PERSON(S), OR THE ENTITY UPON BEHALF OF WHICH THE PERSON(S) ACTED, EXECUTED THE INSTRUMENT.

I CERTIFY UNDER PENALTY OF PERJURY UNDER THE LAWS OF THE STATE OF CALIFORNIA THAT THE FOREGOING PARAGRAPH IS TRUE AND CORRECT.

WITNESS MY HAND AND OFFICIAL SEAL
NOTARY'S SIGNATURE _____
PRINTED NOTARY'S NAME _____
COMMISSION NO. _____

ENGINEER'S STATEMENT

THIS MAP WAS PREPARED BY ME OR UNDER MY DIRECTION AND IS BASED UPON A FIELD SURVEY IN CONFORMANCE WITH THE REQUIREMENTS OF THE SUBDIVISION MAP ACT AND LOCAL ORDINANCE AT THE REQUEST OF "BARRY SWENSON BUILDER" IN FEBRUARY 2011. I HAVE CONDUCTED A RECONSTRUCTION SURVEY OF THE SUBDIVISION MAP ACT AND LOCAL ORDINANCES APPLICABLE AT THE TIME OF APPROVAL OF THE TENTATIVE MAP, HAVE BEEN COMPLIED WITH, AND I AM SATISFIED THAT THIS MAP IS TECHNICALLY CORRECT. WE HEREBY REJECT PARCEL "X" FOR ROAD PURPOSES AND FOR PUBLIC UTILITY PURPOSES. WE HEREBY REJECT PARCEL "A" FOR ROAD PURPOSES AND FOR PUBLIC UTILITY PURPOSES. WE HEREBY ACCEPT PARCEL "X" FOR ROAD PURPOSES AND FOR PUBLIC UTILITY PURPOSES. WE HEREBY ACCEPT PARCEL "A" FOR ROAD PURPOSES AND FOR PUBLIC UTILITY PURPOSES. WE HEREBY REJECT PARCEL "X" FOR ROAD PURPOSES AND FOR PUBLIC UTILITY PURPOSES. WE HEREBY REJECT PARCEL "A" FOR ROAD PURPOSES AND FOR PUBLIC UTILITY PURPOSES.

DATE: _____
JOE L. AKERS RCE 20372
EXPIRATION 9/30/11



COUNTY SURVEYOR'S STATEMENT

I HEREBY STATE THAT I HAVE EXAMINED THIS MAP THAT THE SUBDIVISION AS SHOWN IS SUBSTANTIALLY THE SAME AS IT APPEARED ON THE TENTATIVE MAP, AND THAT NO ALTERATIONS THEREOF, ALL PROVISIONS OF THE SUBDIVISION MAP ACT AND OF ANY LOCAL ORDINANCES APPLICABLE AT THE TIME OF APPROVAL OF THE TENTATIVE MAP, HAVE BEEN COMPLIED WITH, AND I AM SATISFIED THAT THIS MAP IS TECHNICALLY CORRECT. WE HEREBY REJECT PARCEL "X" FOR ROAD PURPOSES AND FOR PUBLIC UTILITY PURPOSES. WE HEREBY REJECT PARCEL "A" FOR ROAD PURPOSES AND FOR PUBLIC UTILITY PURPOSES. WE HEREBY ACCEPT PARCEL "X" FOR ROAD PURPOSES AND FOR PUBLIC UTILITY PURPOSES. WE HEREBY ACCEPT PARCEL "A" FOR ROAD PURPOSES AND FOR PUBLIC UTILITY PURPOSES.

DATE: _____
DON HILL
COUNTY SURVEYOR
LS 6950 EXP: 09-30-11

PARCEL MAP

MILD NO. 04-0176

APN 029-101-03

CONSISTING OF THREE SHEETS

BEING THE LANDS OF GREEN VALLEY CORPORATION

AS RECORDED IN

DOCUMENT NO. 2011-0008855

SANTA CRUZ COUNTY OFFICIAL RECORDS

SANTA CRUZ COUNTY, CALIFORNIA

FEBRUARY 2011

BY: _____
COUNTY RECORDER

DEPUTY

LEGEND

- ⊙ INDICATES CO. S.C. STREET MONUMENT FOUND, AS NOTED
- ⊙ INDICATES CO. S.C. STREET MONUMENT SET
- INDICATES SURVEY MONUMENT FOUND, AS NOTED
- INDICATES 3/4" I.P. SET, TAGGED RCE 20372
- INDICATES DISTINCTIVE BORDER LINE
- INDICATES LOT LINE
- INDICATES OTHER PROPERTY LINE
- () INDICATES RECORD DATA
- (R) INDICATES RADIAL BEARING
- PSDE INDICATES PRIVATE STORM DRAIN EASEMENT

THE DISTINCTIVE BORDER INDICATES THE LIMITS OF THE LAND BEING SUBDIVIDED
 TOTAL AREA SUBDIVIDED BY THIS MAP = 40,908 SF
 DISTANCES ARE SHOWN IN FEET AND DECIMALS THEREOF

BASIS OF BEARING

THE BEARING N 12°54' E. OF THE CENTER LINE OF CHANTICLEER AVENUE AS SHOWN UPON THAT RECORD OF SURVEY RECORDED IN VOLUME 91 OF MAPS AT PAGE 15 OF THIS COUNTY RECORDS AND ESTABLISHED FROM FOUND MONUMENTS AS SHOWN WAS TAKEN AS THE BASIS OF BEARINGS FOR THIS SURVEY.

RECORD DATA REFERENCES

1. DEED 2006-0046829
2. RECORD OF SURVEY 91 M 15
3. PARCEL MAP 51 PM 14
4. RECORD OF SURVEY 106 M 30
5. RECORD OF SURVEY 106 M 30
6. AMENDED PARCEL MAP 49 PM 58

PARCEL MAP

M/LD NO. 04-0176
 API 029-161-03
 CONSISTING OF THREE SHEETS
 BEING THE LANDS OF GREEN VALLEY CORPORATION
 AS RECORDED IN
 DOCUMENT NO. 2011-000855
 OFFICIAL RECORDS OF SANTA CRUZ COUNTY
 SANTA CRUZ COUNTY, CALIFORNIA
 FEBRUARY 2011

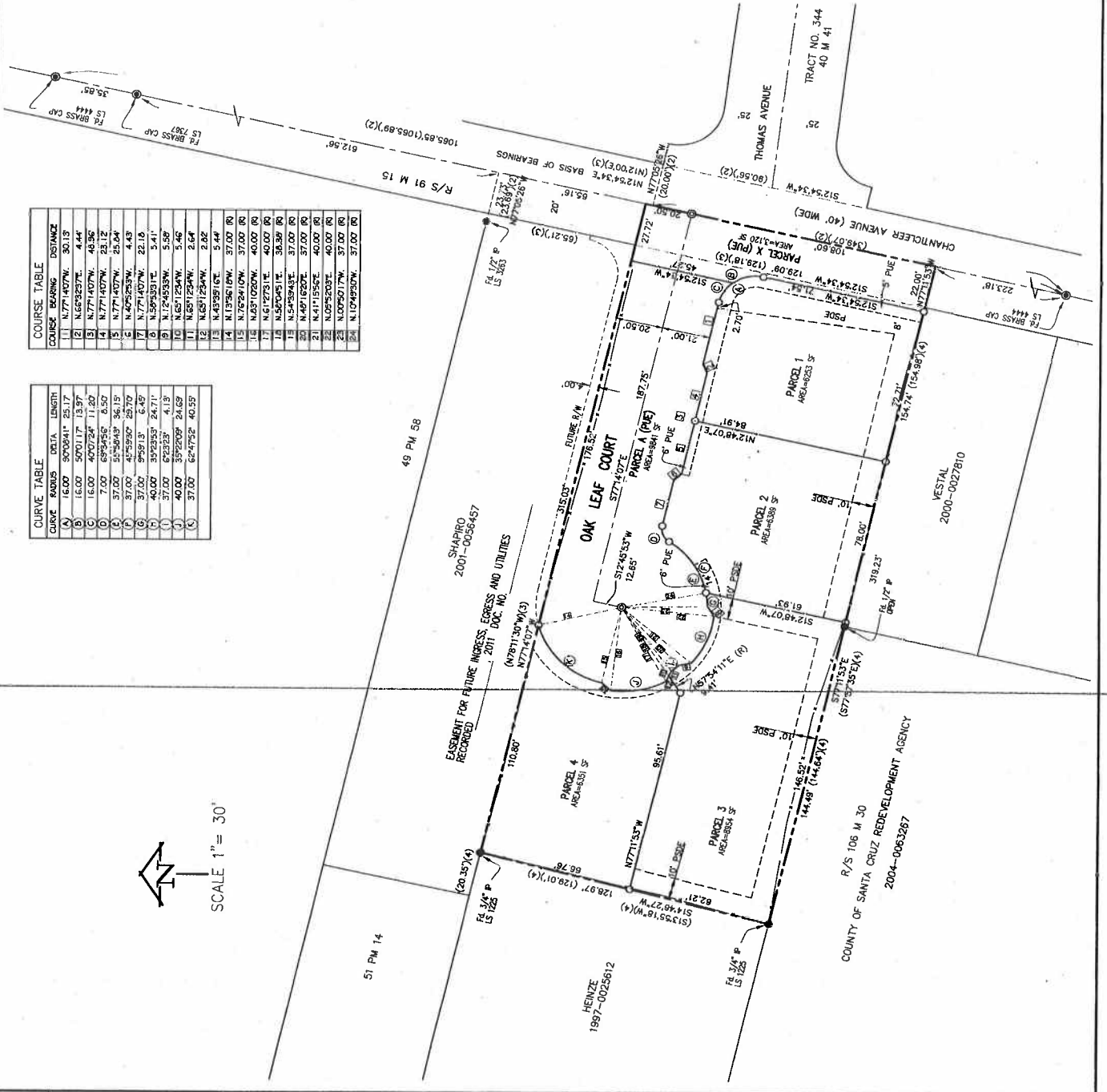
JOE L. AKERS
 CIVIL ENGINEER
 630 BAY AVE. STE E CAPITOLA, CA 95010 (831) 475-6857

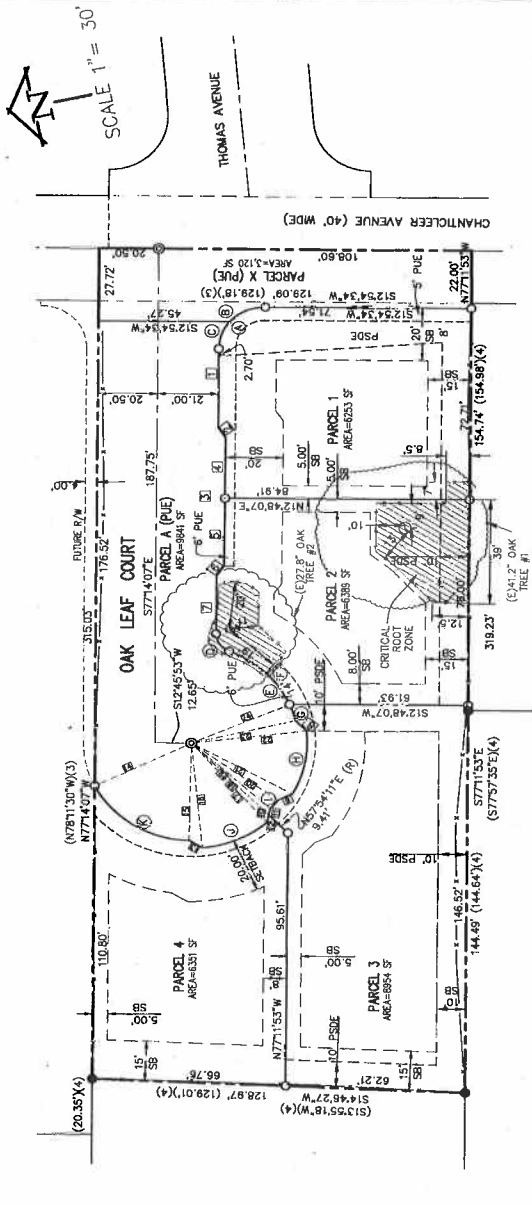
COURSE	BEARING	DISTANCE
1	N 77°14'07"W	30.13
2	N 65°23'37"E	4.44
3	N 77°14'07"W	48.36
4	N 77°14'07"W	23.12
5	N 77°14'07"W	25.04
6	N 40°52'53"W	4.43
7	N 77°14'07"W	22.18
8	N 59°53'31"E	5.41
9	N 12°45'33"W	5.99
10	N 65°12'24"W	5.46
11	N 65°12'24"W	2.64
12	N 65°12'24"W	2.82
13	N 43°51'01"E	5.44
14	N 13°56'19"W	37.00 (R)
15	N 72°54'10"W	37.00 (R)
16	N 65°10'28"W	40.00 (R)
17	N 41°27'31"E	40.00 (R)
18	N 50°09'51"E	36.36 (R)
19	N 42°52'11"E	37.00 (R)
20	N 44°01'55"E	40.00 (R)
21	N 44°01'55"E	40.00 (R)
22	N 02°55'20"E	40.00 (R)
23	N 02°55'20"E	40.00 (R)
24	N 10°48'37"W	37.00 (R)
25	N 10°48'37"W	37.00 (R)

CURVE	RADIUS	DELTA	LENGTH
A	16.00	30°00'41"	29.17
B	16.00	50°01'17"	13.97
C	16.00	40°07'24"	11.20
D	7.00	69°54'56"	6.50
E	37.00	55°50'48"	36.19
F	37.00	45°59'00"	29.70
G	37.00	9°59'13"	6.49
H	40.00	39°33'53"	24.71
I	37.00	62°32'59"	4.19
J	40.00	39°22'09"	24.69
K	37.00	62°47'52"	40.59



SCALE 1" = 30'





- THE FOLLOWING REQUIREMENTS SHALL BE COMPLETED PRIOR TO OBTAINING A BUILDING PERMIT ON LOTS CREATED BY THIS LAND DIVISION.
1. LOTS SHALL BE CONNECTED FOR WATER SERVICE TO CITY OF SANTA CRUZ WATER DISTRICT.
 2. LOTS SHALL BE CONNECTED FOR SEWER SERVICE TO COUNTY SANITATION DISTRICT. ALL REGULATIONS AND CONDITIONS OF THE SANITATION DISTRICT SHALL BE MET.
 3. ALL FUTURE CONSTRUCTION ON THE LOTS SHALL CONFORM TO THE ARCHITECTURAL FLOOR PLANS AND ELEVATIONS AND THE PERSPECTIVE DRAWING AS STATED OR DEPICTED IN SHEETS "A" AND "B" AND SHALL ALSO MEET THE FOLLOWING ADDITIONAL CONDITIONS:
 - a. EXTERIOR FINISHES SHALL INCORPORATE STUCCO SIDE WOOD SHAKLES AND WOODS TRIM FINISHED IN WHITE WITH WOOD AGENTS AND DETAILS, AS SHOWN ON THE APPROVED PLANS. 1 1/4" TYPE WOOD SHAKLES IS NOT PERMITTED.
 - b. NOTWITHSTANDING THE APPROVED PRELIMINARY ARCHITECTURAL PLANS, ALL FUTURE DEVELOPMENT SHALL COMPLY WITH THE DEVELOPMENT STANDARDS FOR THE RZA ZONE (AS SET FORTH IN THE CITY OF SANTA CRUZ ZONING ORDINANCE) AND THE LOT COVERAGE, OR 90 PERCENT FLOOR AREA RATIO, OR OTHER STANDARDS AS MAY BE ESTABLISHED FOR THE ZONE DISTRICT.
 - c. THE SOUTH FACING WINDOWS ON THE SECOND STORY OF THE RESIDENCE ON LOT 3 AND THE NORTH FACING WINDOWS ON THE SECOND STORY OF THE RESIDENCE ON LOT 4 SHALL UTILIZE OBSCURED GLASS OR SHALL BE GLASS BLOCK WINDOWING.
 - d. LOTS 1, 2 AND 4 SHALL HAVE A MINIMUM OF THREE ON-SITE PARKING SPACES AND LOTS 3 SHALL HAVE A MINIMUM OF FOUR ON-SITE PARKING SPACES, INCLUDING BOTH COVERED AND UNCOVERED SPACES.
 - e. FOR ANY STRUCTURE PROPOSED TO BE WITHIN 2 FEET OF THE MAXIMUM HEIGHT LIMIT FOR THE ZONE DISTRICT, THE BUILDING SHALL BE SET BACK FROM THE FRONT YARD SETBACK LINE TO ALLOW FOR A MINIMUM OF 2 FEET OF CLEARANCE FROM THE FRONT YARD SETBACK LINE TO THE FRONT PORCH OR ENTRY. THE SETBACK SHALL HAVE THE GREATEST DIFFERENCE BETWEEN GROUND SURFACE (EXISTING AND FINAL GRADES) AND THE HIGHEST PORTION OF THE STRUCTURE ABOVE. THIS REQUIREMENT IS IN ADDITION TO THE STANDARD REQUIREMENT OF DETAILED ELEVATIONS AND FINISHES AND THE TOPOGRAPHY OF THE PROJECT SITE, WHICH CLEARLY DEPICTS THE TOTAL HEIGHT OF THE PROPOSED STRUCTURE.
 - f. FOR BUILDING SITES CONTAINING FULL PLANTED AS PART OF THE LAND DIVISION IMPROVEMENTS, THE BUILDING HEIGHT SHALL INCLUDE THE HEIGHT OF THE FULL ABOVE THE ORIGINAL GRADE.
 - g. NO FENCING SHALL EXCEED THREE FEET IN HEIGHT WITHIN THE REQUIRED FRONT YARD OR STREET-SIDE SETBACKS AND SHALL NOT EXCEED SIX FEET IN HEIGHT WITHIN THE REQUIRED REAR YARD OR REAR YARD SETBACKS.
 - h. TRIMMING OR PRUNING OF THE OAK TREES ON LOT 2 IS PROHIBITED, UNLESS COMPLETED UNDER THE SUPERVISION OF THE PROJECT CERTIFIED ARBORIST.
 - i. PRIOR TO BUILDING PERMIT ISSUANCE FOR THE DETACHED ACCESSORY STRUCTURE ON LOT 3, THE OWNER SHALL RECORD DECLARATIONS OF RESTRICTIONS SPECIFYING THE ALLOWED USES FOR THE NON-HABITABLE GARAGE AND THE HABITABLE ACCESSORY STRUCTURE.
 4. A FINAL LANDSCAPE PLAN FOR THE ENTIRE SITE SPECIFYING THE SPECIES, THEIR SIZE AND IRRIGATION PLANS AND MEETING THE FOLLOWING CRITERIA AND MUST CONFORM TO ALL WATER CONSERVATION REQUIREMENTS OF THE CITY OF SANTA CRUZ WATER DISTRICT REGULATIONS AND TO THE TREE PRESERVATION RECOMMENDATIONS CONTAINED IN THE ARBORIST REPORT BY MAUREEN HARM.
 - a. TURF LIMITATION. TURF AREA SHALL NOT EXCEED 25 PERCENT OF THE TOTAL LANDSCAPED AREA. TURF AREA SHALL BE OF LOW TO MODERATE WATER-USING VARIETIES, SUCH AS TALL ORNAMENTAL FESCUE.
 - b. PLANT SELECTION. AT LEAST 80 PERCENT OF THE PLANT MATERIALS SELECTED FOR NON-TURF AREAS (EQUIVALENT TO 80 PERCENT OF THE TOTAL LANDSCAPED AREA) SHALL BE WELL SUITED TO THE CLIMATE OF THE REGION AND REQUIRES MINIMAL WATER IN NON-TURF AREAS (EQUIVALENT TO 20 PERCENT OF THE TOTAL LANDSCAPED AREA). NEED NOT BE DROUGHT TOLERANT, PROVIDED THEY ARE GROUPED TOGETHER AND CAN BE IRRIGATED SEPARATELY.
 - c. PLANTINGS ARE PROHIBITED WITHIN THE CRITICAL ROOT ZONE OF THE TWO EXISTING OAK TREES.
 - i. CRITICAL ROOT ZONE OF THE EXISTING OAKS SHALL BE TREATED WITH MULCH, WOOD CHIPS, RIVER ROCK OR OTHER TREATMENT AS RECOMMENDED BY THE PROJECT ARBORIST.
 - ii. SOIL CONDITIONING. IN NON-PLANTING AREAS, SOIL SHALL BE TILLED TO A DEPTH OF 8 INCHES AND AMENDED WITH SIX CUBIC YARDS OF ORGANIC MATERIAL PER 1,000 SQUARE FEET TO PROMOTE INFILTRATION AND WATER RETENTION. AFTER PLANTING, A MULCH LAYER SHALL BE APPLIED TO ALL NON-TURF AREAS TO RETAIN MOISTURE, REDUCE EVAPORATION, AND INHIBIT WEED GROWTH.
 - d. IRRIGATION MANAGEMENT. ALL REQUIRED LANDSCAPING SHALL BE PROVIDED WITH AN ADEQUATE PERMANENT AND NEARBY SOURCE OF WATER. IRRIGATION SYSTEMS SHALL BE DESIGNED TO AVOID RUNOFF, OVER SPRAY, LOW HEAD DRAINAGE, OR OTHER SIMILAR CONDITIONS WHERE WATER FLOWS ONTO ADJACENT PROPERTY, NON-IRRIGATED AREAS, WALKS, ROADWAYS OR STRUCTURES.
 - e. IRRIGATION PLAN AND AN IRRIGATION SCHEDULE FOR THE ESTABLISHED LANDSCAPE SHALL BE SUBMITTED WITH THE BUILDING PERMIT APPLICATIONS. THE IRRIGATION PLAN SHALL SHOW THE LOCATION, SIZE AND TYPE OF COMPONENTS OF THE IRRIGATION SYSTEM, THE POINT OF CONNECTION TO THE PUBLIC WATER SUPPLY AND DESIGNATION OF HYDROZONES, THE AMOUNT OF WATER, IN GALLONS OR HUNDRED CUBIC FEET, RECOMMENDED ON A DAILY, WEEKLY, MONTHLY AND ANNUAL BASIS.
 - f. IRRIGATION WITHIN THE CRITICAL ROOT ZONES ESTABLISHED IN THE ARBORIST'S REPORT IS PROHIBITED. IRRIGATION OUTSIDE OF CRITICAL ROOT ZONE, BUT UNDER THE CANOPE OF EACH EXISTING OAK SHALL BE LIMITED TO VERY LOW FLOW DRIP-TYPE EMITTERS.
 - g. APPROVED IRRIGATION SYSTEMS, INCLUDING THE USE OF A SEPARATE LANDSCAPE WATER METER, PRESSURE REGULATORS, AUTOMATED CONTROLS, LOW FLOW EMITTERS, SHUT-OFF DEVICES, AND OTHER EQUIPMENT SHALL BE USED TO MAXIMIZE THE EFFICIENCY OF WATER APPLIED TO THE LANDSCAPE.
 - h. PLANTS HAVING SIMILAR WATER REQUIREMENTS SHALL BE GROUPED TOGETHER IN DISTRICT HYDROZONES AND SHALL BE IRRIGATED SEPARATELY.
 - i. LANDSCAPE IRRIGATION SHOULD BE SCHEDULED BETWEEN 6:00 PM AND 11:00 AM TO REDUCE EVAPORATIVE WATER LOSS.
 - j. ALL PLANTING SHALL CONFORM TO THE PRELIMINARY PLAN SHOWN AS PART OF EXHIBIT "A", EXCEPT THAT ALL TREES PLANTED WITHIN THE CRITICAL ROOT ZONE OF EXISTING OAKS SHALL BE 24-INCH BOX IN SIZE AND SHALL BE SELECTED FROM THE SUGGESTED PLANTING LIST IN THE URBAN FORESTRY HANDBOOK "A".
 5. ALL LANDSCAPING SHALL BE PERMANENTLY MAINTAINED BY THE PROPERTY OWNER INCLUDING ANY PLANTINGS WITHIN THE COUNTY RIGHT-OF-WAY ALONG THE FRONT FACE OF THE PROPERTY.
 - a. ANY TREES PLANTED IN THE COUNTY RIGHT-OF-WAY SHALL BE APPROVED BY THE DEPARTMENT OF PUBLIC WORKS AND SHALL BE INSTALLED ACCORDING TO INDUSTRY STANDARDS OF THE COUNTY DESIGN CRITERIA.
 - b. NOTICES SHALL BE ADDED TO THE IMPROVEMENT PLANS AND THE BUILDING PERMIT PLANS THAT INCLUDE ALL OF THE TREE PROTECTION MEASURES SPECIFIED IN THE ARBORIST REPORT IN ORDER TO PROTECT THE TWO EXISTING OAK TREES DURING CONSTRUCTION.

5. THE FINAL PLANS SHALL BE CONSISTENT WITH THE RECOMMENDATIONS OF THE ACCEPTED SOILS REPORT BY HARO MASUNICK, DATED 10/15/09, AND THE RECOMMENDATIONS OF THE PROJECT SOILS REPORT AND SOILS ENGINEER. A PLAN REVIEW LETTER FROM THE PROJECT SOILS ENGINEER IS REQUIRED.
6. THE FINAL PLANS SHALL BE CONSISTENT WITH THE RECOMMENDATIONS OF THE ACCEPTED ARBORIST REPORT BY MAUREEN HARM, DATED 10/15/09, AND THE RECOMMENDATIONS OF THE PROJECT ARBORIST REPORT AND INCLUDE THE ARBORIST'S NAME AND CONTACT NUMBER. A PLAN REVIEW LETTER FROM THE PROJECT ARBORIST IS REQUIRED.
7. SUBMIT GRADING AND DRAINAGE PLANS THAT INCLUDE LIMITS OF GRADING, ESTIMATED EARTHWORK, CROSS SECTIONS THROUGH ALL PLACES HAVING EXISTING AND PROPOSED GRADING, AND DETAILS OF DEVICES SUCH AS BACK DRAINS, GULLY CUTS, ENERGY DISSIPATORS, ETC. FINAL DRAINAGE AND GRADING PLANS SHALL INCORPORATE THE COMMENTS OF DAVID SANG DATED APRIL 15, 2009 AND SHALL INCLUDE THE FOLLOWING:
 - a. THE FINAL DRAINAGE PLAN SHALL INCLUDE A DETENTION SYSTEM.
 - b. FULL DETENTION DESIGN CALCULATIONS AND ALL MAINTENANCE AGREEMENTS SHALL BE SUBMITTED WITH THE FINAL IMPROVEMENT PLANS.
 - c. THE FINAL DRAINAGE PLANS SHALL INCORPORATE THE RECOMMENDATIONS FOR DRAINAGE IMPROVEMENT LOCATIONS AND CONSTRUCTION METHODS CONTAINED IN THE ACCEPTED ARBORIST REPORT.
 - d. THE FINAL GRADING PLANS SHALL INCLUDE ALL TREE PROTECTION MEASURES INCLUDING FENCING LOCATIONS AND SPECIFICATIONS SET FORTH IN THE ACCEPTED ARBORIST REPORT.
 - e. FINAL GRADING PLANS SHALL PROVIDE CROSS SECTIONS SHOWING THE EXISTING AND PROPOSED GRADES AND THE MAXIMUM FILL DEPTHS THROUGHOUT ALL THE BUILDING SITES.
8. THE FINAL GRADING PLANS SHALL BE REVIEWED AND APPROVED BY THE ENVIRONMENTAL PLANNING SECTION OF THE PLANNING DEPARTMENT AND THE DEPARTMENT OF PUBLIC WORKS.
 - a. ZONE 5 DRAINAGE FEES WILL APPLY TO THE NET INCREASE IN IMPERVIOUS SURFACE.
9. SUBMIT A WRITTEN STATEMENT SIGNED BY AN AUTHORIZED REPRESENTATIVE OF THE SCHOOL DISTRICT IN WHICH THE PROJECT IS LOCATED CONFIRMING PAYMENT IN FULL OF ALL APPLICABLE DEVELOPER FEES AND OTHER REQUIREMENTS LAWFULLY IMPOSED BY THE COUNTY OF SANTA CRUZ. THE STATEMENT SHALL BE FILED WITH THE COUNTY CLERK OF THE COUNTY OF SANTA CRUZ. IT IS ADVISED THAT THE DEVELOPMENT MAY BE SUBJECT TO INSURANCE THROUGH COMMUNITY FACILITIES DISTRICT.
10. PRIOR TO ANY BUILDING PERMIT ISSUANCE OR GROUND DISTURBANCE, A DETAILED EROSION CONTROL PLAN SHALL BE REVIEWED AND APPROVED BY THE COUNTY ENGINEER. THE EROSION CONTROL PLAN SHALL BE FILED WITH THE COUNTY ENGINEER. THE EROSION CONTROL PLAN SHALL REQUIRE A SEPARATE WATER GRADING APPROVAL FROM ENVIRONMENTAL PLANNING THAT MAY OR MAY NOT BE GRANTED. THE EROSION CONTROL PLANS SHALL IDENTIFY THE LOCATION AND TYPE OF EROSION CONTROL, PRACTICES AND DEVICES TO BE USED AND SHALL INCLUDE THE FOLLOWING:
 - a. AN EFFECTIVE SEDIMENT BARRIER PLACED ALONG THE PERIMETER OF THE DISTURBANCE AREA AND MAINTENANCE OF THE BARRIER.
 - b. SOIL MANAGEMENT THAT PREVENTS LOOSE MATERIAL FROM LEAVING THE SITE.
 - c. A PLAN TO PREVENT CONSTRUCTION VEHICLES FROM CARRYING SOIL, DIRT, GRAVEL, OR OTHER MATERIAL ONTO PUBLIC STREETS. THE OWNER/APPPLICANT IS TO BE RESPONSIBLE FOR CLEANING THE STREET SHOULD MATERIALS FROM THE SITE REACH THE STREET.
 - d. TREE PROTECTION FENCING AND SIGN BARRIERS.
11. ANY CHANGES BETWEEN THE APPROVED TENTATIVE MAP, INCLUDING BUT NOT LIMITED TO THE ATTACHED EXHIBITS FOR ARCHITECTURAL AND LANDSCAPING PLANS, MUST BE SUBMITTED FOR REVIEW AND APPROVAL BY THE DESIGN/DEVELOPER BODY. SUCH CHANGES SHALL BE INCLUDED IN A REPORT TO THE DESIGN/DEVELOPER BODY TO CONSIDER IF THEY ARE SUFFICIENTLY MATERIAL TO WARRANT CONSIDERATION AT A PUBLIC HEARING NOTICED IN ACCORDANCE WITH SECTION 18.0022 OF THE COUNTY CODE.

NOTE: ADDITIONAL NON-TITLE INFORMATION WAS RECORDED CONCURRENTLY WITH THIS MAP IN THE OFFICIAL RECORDS OF SANTA CRUZ COUNTY.

"NON TITLE INFORMATION" PARCEL MAP

M.L.D. NO. 04-0176
 APR. 029-101-03
 CONSISTING OF THREE SHEETS
 BEING THE LANDS OF GREEN VALLEY CORPORATION
 AS RECORDED IN
 DOCUMENT NO. 2011-000885
 OFFICIAL RECORDS OF SANTA CRUZ COUNTY
 SANTA CRUZ COUNTY, CALIFORNIA
 FEBRUARY, 2011

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