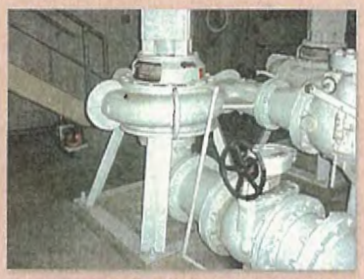

ASSESSMENT OF SEWER LIFT STATIONS AND NORTH COAST INTERCEPTOR

APRIL 2003

BOYLE ENGINEERING CORPORATION

Assessment of Sewer Lift Stations and North Coast Interceptor

City of Laguna Beach

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Table of Contents

PART 1
OVERVIEW AND PRIORITIZATION

1.1 Overview

In March 2002 the City adopted a Strategic Plan for Improvement of the Sanitary Sewer System with the purpose to identify the actions necessary to eliminate preventable sewer spills. The strategic plan includes a preliminary assessment of the City's 26 lift stations and identified the need for a more in-depth review of the stations, their deficiencies and opportunities for improvement. Another conclusion of the strategic plan was that an assessment of the condition of the primary transmission line to the Sewage Treatment plant, commonly referred to as the North Coast Interceptor (NCI), is necessary.

In September 2002 the United States Environmental Protection Agency issued a Finding of Violation and Order for Compliance to the City after an NPDES compliance investigation. The order reiterates the need of a more in-depth assessment of the City's lift stations and the North Coast Interceptor.

Following through with the system assessment needs, the City solicited proposals for the lift stations and NCI engineering assessments and entered into an agreement with Boyle Engineering Corporation in October 2002 for the work.

This report is organized in three parts. The first part provides a summary and overall prioritization for the lift stations and NCI recommended improvements. The second part focuses on the analysis of the lift stations and the third part analyzes the NCI.

1.2 Summary of Recommendations

1.2.1 General

Analysis of the sewer lift stations and North Coast Interceptor has resulted in the recommendation of improvements to increase the reliability of the City's overall sanitary sewer system. These are summarized below. More detail leading to these recommendations can be found in the analyses of Parts 2 and 3.

1.2.2 Sewer Lift Stations

Analysis of the 26 lift stations has led to recommendation of the improvements. Table 1-1 summarizes the observations and improvements recommended for each lift station. One common recommendation for each lift station is the addition of a combustible gas detector for the wet well.

1.2.3 North Coast Interceptor

Following is a list of recommended improvements to the North Coast Interceptor.

Project Number	Project Description
16	**Nyes Place Siphon Rehabilitation** - rehabilitate the existing corroded steel pipe reach in the siphon at Nyes Place by insertion of a liner. Investigate revising the profile at the bottom section to eliminate the local high point.
17	**Parallel Force Main from Laguna Lift Station** - construct a parallel force main from the Laguna Lift Station to the beginning of the VCP gravity segment at Catalina St. and El Camino.
18	**Parallel Force Main from Bluebird Lift Station** - construct a parallel force main from the Bluebird Lift Station to the beginning of the FRP pipe gravity segment in the Pacific Coast Highway at Victoria Place.
19	**Relocate Portion within Aliso Creek** - relocate the portion of the gravity siphon segment that is directly within the Aliso Creek channel.

Project Number	Project Description
20	**Rehabilitate Manholes on VCP Gravity Segment** - rehabilitate the manholes on the VCP gravity segment by repairing and lining the base and shaft sections and replacing the manhole adjacent to the Bluebird Lift Station.
21	**Construct Manholes on FRP Pipe Gravity Segment** - construct conventional gravity sewer manholes at each end of the two siphons and at standard spacing on the remainder of the FRP pipe gravity segment.
22 23	**Rehabilitate the Existing ACP Force Mains** - rehabilitate the two existing ACP force mains as necessary after construction of the parallel force mains by lining.

Costs are estimated in following Table 1-2.

Table 1-1 Lift Stations Condition Summary			
Lift Station			
Number	Name	Observations/Major Recommendations	Estimated Project Cost ($1,000)
1	Victoria Beach #1	Dry concrete in good condition, wet well concrete is corroding. Condensation and rust are problems. Recommendations: Apply protective coating in wet well, schedule pumps/motors for replacement, install generator unit and extend to LS #2, replace corroded electrical equipment.	159 This $ = > 200
2	Victoria Beach #2	Dry concrete in good condition, wet well concrete is corroding, corroded sump pump. Recommendations: Apply protective coating in wet well, replace corroded electrical equipment.	48
3	Rockledge	Dry concrete in good condition, wet well is fiberglass tank with overflow to pump room, ICP is corroded. Recommendations: Schedule pumps/motors for replacement, replace force main, replace corroded electrical equipment.	85
4	Millers	Dry concrete in good condition, wet well concrete is corroding, steel plate floor is corroded, conduit and power pullbox are corroded. Recommendations: Schedule pumps/motors for replacement, replace force main, relocate electrical panel outdoors, replace corroded electrical equipment.	106
5	Pearl Street	Dry concrete in generally good condition, wet well concrete is corroded, telephone	113

Table 1-1 Lift Stations Condition Summary			
Lift Station			
Number	Name	Observations/Major Recommendations	Estimated Project Cost ($1,000)
		cabinet is corroded. Recommendations: Apply protective coating in wet well, install generator unit, replace corroded electrical equipment.	
6	Bluebird Canyon	Wet well concrete is corroding, exhaust fan is corroded. Recommendations: Apply protective coating in wet well, replace corroded electrical equipment, provide additional wet well storage.	83
7	Brooks Street	Dry concrete in good condition, wet well is fiberglass tank with overflow to pump room, electrical items are corroded. Recommendations: Schedule pumps/motors for replacement, replace corroded electrical equipment, install generator unit, relocate electrical panel outdoors.	154
8	Anita Street	Dry concrete in need of some repair, wet well concrete is corroded, electrical items are corroded. Recommendations: Schedule pumps/motors for replacement, apply protective coating in wet well, replace force main, replace corroded electrical equipment.	112
9	Cleo Street	Dry concrete and wet well concrete in generally good condition, electrical items are corroded. Recommendations: Schedule pumps/motors for replacement, replace corroded electrical equipment.	54
10	Animal Shelter	Wet well concrete in good condition. Recommendations: Schedule	23

Table 1-1 Lift Stations Condition Summary			
Lift Station			
Number	Name	Observations/Major Recommendations	Estimated Project Cost ($1,000)
		pumps/motors for replacement.	
11	Main Beach	Dry concrete in generally good condition, wet well concrete is corroded, exhaust fan is corroded. Recommendations: Apply protective coating in wet well, replace corroded electrical equipment, relocate generator and transfer switch outside of station, provide additional wet well storage.	237
12	Heisler Park	Wet well concrete is corroding. Recommendations: Abandon the station.	46
13	Fisherman's Cove	Dry concrete in generally good condition, wet well concrete is corroded, electrical items are corroded. Recommendations: Apply protective coating in wet well, relocate electrical panels outside, replace corroded electrical equipment.	80
14	Fairview	Dry concrete in generally good condition, wet well concrete is corroded, exhaust fan is corroded. Recommendations: Station is scheduled for extensive rehabilitation, including pump/motor replacement, new wet well, and electrical equipment replacement. A generator unit will provide standby power for LS #13.	801
15	Crescent Bay	Masonry building in need of repair, wet well concrete is corroded, exhaust fan is corroded. Recommendations: Apply protective coating in wet well, repair building pilasters, replace corroded electrical equipment.	52

Table 1-1 Lift Stations Condition Summary			
Lift Station			
Number	Name	Observations/Major Recommendations	Estimated Project Cost ($1,000)
16	McKnight	Stairwall walls permit stormwater to flood stairwell and Lift Station, station does not have a wet well, inadequate clearance for electrical panel. Recommendations: Raise top of stairwell, schedule pumps/motors for replacement, provide wet well, replace/relocate electrical panel.	100
17	Irvine Cove	Dry concrete in generally good condition, wet well concrete is corroded, exhaust fan is corroded. Recommendations: Apply protective coating in wet well, schedule pumps/motors for replacement, replace corroded electrical equipment, install generator unit, replace and relocate electrical panel outdoors.	177
18	Santa Cruz	Wet well concrete is corroding. Recommendations: Abandon the station.	78
19	Bernard Court	Dry concrete in generally good condition, wet well concrete is corroded, exhaust fan is corroded. Recommendations: Abandon the station.	169
20	Laguna Canyon	The station is currently being abandoned.	Not part of study
21	Bonn Drive	Dry concrete in good condition, wet well concrete is corroded. Recommendations: Apply protective coating in wet well, schedule pumps/motors for replacement, install generator unit.	1412
22	Arch Beach Heights	Dry concrete in good condition, wet well concrete is corroded. Recommendations: Abandon the station.	221

Table 1-1 Lift Stations Condition Summary			
Lift Station			
Number	Name	Observations/Major Recommendations	Estimated Project Cost ($1,000)
23	Old Top of the World	Wet well concrete and below-grade generator vault concrete in good condition. Recommendations: Schedule pumps/motors for replacement.	38
24	Nyes Place	Wet well concrete and below-grade generator and valve vault concrete in good condition. Recommendations: Schedule pumps/motors for replacement, provide additional wet well storage.	134
25	Laguna SOCWA	Wet well concrete was recently coated, covering corroded concrete. Recommendations: Schedule pumps/motors for replacement, construct additional wet well storage, replace corroded electrical equipment.	812
26	Bluebird SOCWA	Wet well concrete was recently coated, covering corroded concrete. Recommendations: Schedule pumps/motors for replacement, construct additional wet well storage, replace corroded electrical equipment, extend monorail for equipment removal.	1,202
		Total Project Cost	**4,425**

Table 1-2
Recommended Improvements for the North Coast Interceptor

Project	Construction Cost	Project Cost [1]
Parallel Laguna Lift Station Force Main	$ 1,030,000	$ 1,340,000
Parallel Bluebird Lift Station Force Main	$ 1,710,000	$ 2,320,000
Rehabilitate Existing Laguna PS Force Main	$ 650,000	$ 850,000
Rehabilitate Existing Bluebird PS Force Main	$ 1,160,000	$ 1,510,000
Rehabilitate Manholes on VCP Gravity Portion	$ 100,000	$ 130,000
Rehabilitate Steel Pipe Siphon at Nyes Place	$ 300,000	$ 400,000
Construct Manholes on FRP Pipe Gravity Portion	$ 160,000	$ 210,000
Relocate NCI Pipe Out of Aliso Creek [2]	$ 420,000	$ 550,000
TOTAL	**$ 5,530,000**	**$ 7,210,000**

1. Project cost includes a 30% allowance for engineering, administration, inspection and legal.

2. Cost does not include right of way acquisition.

1.3 Prioritization of Recommended Improvements

In order to develop an overall listing of the recommended improvements to prioritize expenditures, a risk assessment ranking matrix was developed. Each improvement is intended to decrease the probability of an event with a consequence from occurring. The risk of the event occurring without the improvement is the product of the consequence times the probability of occurrence. A weighting factor is assigned to the each of the probability categories and to each of the consequences based upon severity. Following is a matrix describing this relationship.

Table 1-3
RISK RATIING

Consequence	Probability of Occurrence			
	1 Year Weight = 4	1 to 5 Years Weight = 3	5 to 10 Years Weight = 2	10 to 50 Years Weight = 1
Code compliance, large spill EPA fine, health or safety risk Weight = 4	16	12	8	4
Small Spill or significant increase in maintenance cost Weight = 3	12	9	6	3
Quantifiable increase in cost or quantifiable current expenses continuing Weight = 2	8	6	4	2
No capital cost for > 10 years; no increase in current expenditures Weight = 1	4	3	2	1

Each improvement was evaluated using the above matrix and its' risk rating calculated. Exceptions to this ranking system are code-compliance issues. If a code deficiency is identified, it will automatically be assigned the highest ranking value to force early implementation of improvements, such as installation of gas detection systems in wet wells and electrical work to for operator safety. Table 1-4 demonstrates the rating procedure for each project.

Table 1-5 is a listing of the recommended improvements sorted in order of their respective risk rating. Table 1-6 combines the improvements into projects that are reasonable to implement. The CIP No. column identifies the project and year of proposed construction in accordance with the respective risk rating.

An opinion of probable construction cost has been made for the recommended improvements. The opinion of probable construction cost is based on general industry terms and represents the engineer's judgment as a design professional, not a construction contractor or an estimator, and is supplied for the general guidance of the City. The construction cost opinion is based upon current 2003 prices. The project cost includes a 30% allowance for engineering, administration, inspection and legal costs. In allocating costs to future years a 4% escalation rate per year has been applied to the 2003 cost estimates.

CITY OF LAGUNA BEACH
LIFT STATION AND NCI PROJECTS
TABLE 1-4

Project No.	Description	Immediate Failure Consequence	Secondary Failure Consequence	Rating Procedure		
				Conseq	Probab	Product
1	Electrical work for code compliance	Gas build up	Explosion	4	4	16
2	Gas detection system in wet well (code compliance)	Gas build up	Explosion	4	4	16
3	Electrical relocations/replacement	Electrical failure	Pump failure, spill	3	3	9
4	Replace pump/motor, 20-year schedule, critical need	Pump failure	Spill	3	3	9
5	Replace pump/motor, 20-year schedule, non-critical need	Pump failure	Spill	2	2	4
6	Provide additional wet well capacity (reten <10 min)	Electrical or pump failure	Spill	4	2	8
7	Provide additional wet well capacity (reten 10-20 min)	Electrical or pump failure	Spill	3	3	9
8	Provide additional wet well capacity (reten 20-45 min)	Electrical or pump failure	Spill	3	2	6
9	Replace force main for small lift station	Pipe break	Spill	3	2	6
10	Install pump tee/LS #26 monorail/misc. repair work	More difficult work	Extra time/expense	2	2	4
11	Rehab wet well, incl ladder repl (moderate/severe corrosion)	Structure failure	Collapse, extended out-of-service	4	2	8
12	Rehab wet well, incl ladder repl (minor corrosion)	Structure failure	Collapse, extended out-of-service	4	1	4
13	Not used					
14	Abandon lift station	Continued maintenance	Continued expense	2	3	6
15	Install standby generator	Electrical failure	Pump failure, spill	4	3	12
16	Rehabilitate siphon at Nyes Place	Continued leakage	Damage to PCH, beach spill	4	4	16
17	Parallel Laguna LS ACP force main	Pipe failure	Significant spill	4	4	16
18	Parallel Bluebird LS ACP force main	Pipe failure	Significant spill	4	4	16
19	Relocate gravity siphon within Aliso Creek	Pipe damage	Significant spill	4	3	12
20	Rehabilitate manholes in VCP pipe gravity segment	Structural failure of manhole	Blockage causes a spill at lift station	3	2	6
21	Construct manholes in FRP pipe gravity segment	Lack of maintenance access	Blockage causes a spill at lift station	3	2	6
22	Rehabilitate ACP force main from Laguna LS	No backup of new parallel force main	Significant spill	2	1	2
23	Rehabilitate ACP force main from Bluebird LS	No backup of new parallel force main	Significant spill	2	1	2

CITY OF LAGUNA BEACH
SEWER SYSTEM: RECOMMENDED CAPITAL IMPROVEMENTS
TABLE 1-5

LS NO.	DESCRIPTION	Risk Rating	Project No.	PROJECT COST ($1,000) Yr. No. Est. 2003	1 2004/5	2 2005/6	3 2006/7	4 2007/8	5 2008/9	6 2009/10	7 2010/11	8 2011/12	9 2012/13	10 2013/14
4	d, e.) Relocate electrical panels outside	16	1	30	31									
7	d.) Relocate electrical panel outside	16	1	26	27									
7	f.) Relocate electrical panel outside	16	1	10	10									
11	e.) Relocate genrator and electrical panels outside	16	1	52	54									
13	d.) Relocate electrical panel outside	16	1	26	27									
13	e.) Relocate electrical panel outside	16	1	20	21									
16	a, c.) Relocate electrical panels outside	16	1	26	27									
17	d, f.) Relocate electrical panels outside	16	1	36	37									
1	c.) Wet well gas detector	16	2	13	14									
2	c.) Wet well gas detector, lights, receptacles	16	2	20	21									
3	c.) Wet well gas detector, lights, receptacles	16	2	20	21									
4	c.) Wet well gas detector, lights, receptacles	16	2	20	21									
5	c.) Wet well gas detector, lights, receptacles	16	2	20	21									
6	c.) Wet well gas detector, lights, receptacles	16	2	23	24									
7	c.) Wet well gas detector, lights, receptacles	16	2	20	21									
8	c.) Wet well gas detector, lights, receptacles	16	2	23	24									
9	c.) Wet well gas detector, lights, receptacles	16	2	20	21									
10	c.) Wet well gas detector	16	2	13	14									
11	c.) Wet well gas detector	16	2	16	17									
13	c.) Wet well gas detector, lights, receptacles	16	2	20	21									
15	c.) Wet well gas detector, lights, receptacles	16	2	20	21									
16	b.) Wet well gas detector, lights, receptacles	16	2	20	21									
17	c.) Wet well gas detector, lights, receptacles	16	2	20	21									
21	b.) Wet well gas detector, lights, receptacles	16	2	20	21									
23	b.) Wet well gas detector	16	2	13	14									
24	a.) Wet well gas detector	16	2	13	14									
25	c.) Wet well gas detector	16	2	13	14									
26	c.) Wet well gas detector	16	2	13	14									
25	e.) Replace pumps/motors (variable speed units)	16	4	254	264									
26	f.) Replace pumps/motors (variable speed units)	16	4	345	359									
NCI	Rehab steel pipe siphon at Nyes Place	16	16	400	416									
NCI	Parallel Laguna LS force main	16	17	1,340	1,394									
NCI	Parallel Bluebird LS force main	16	18	2,220	2,309									
1	d.) Generator unit	12	15	91			102							
5	d.) Generator unit	12	15	65			73							
7	e.) Generator unit	12	15	65			73							
14	Rehabilitate station	12	13	801		866								
17	e.) Generator unit	12	15	65			73							
21	c.) Generator unit	12	15	65			73							
NCI	Relocate Aliso Creek Channel crossing	12	19	550		595								
1	a,b) Electrical work	9	3	5				6						
2	a, b) Electrical work	9	3	5				6						
3	a, b) Electrical work	9	3	5				6						
4	a, b) Electrical work	9	3	5				6						
5	a, b) Electrical work	9	3	4				5						
6	a, b) Electrical work	9	3	5				6						
7	a, b) Electrical work	9	3	4				5						
8	a, b) Electrical work	9	3	5				6						
9	a, b) Electrical work	9	3	5				6						
11	a, b, d) Electrical work	9	3	20				23						
13	a, b) Electrical work	9	3	5				6						
15	a, b) Electrical work	9	3	5				6						
17	a, b.) Electrical work	9	3	5				6						
21	a.) Electrical work	9	3	4				5						
23	a) Electrical work	9	3	1				1						
25	a, b) Electrical work	9	3	5				6						
26	a, b) Electrical work	9	3	5				6						
10	a.) Replace pump/motor	9	4	7									10	
16	f.) Replace pumps/motors	9	4	26	27									
17	l.) Replace pumps/motors	9	4	29				34						
21	f.) Replace pumps/motors	9	4	34									48	
11	h.) Additional wet well	9	7	96				112						
24	b.) Additional wet well	9	7	83				97						
16	e.) Additional wet well	8	6	20					24					
26	e.) Additional wet well	8	6	455					554					
1	e.) Wet well rehabilitation	8	11	21					26					
2	d,e.) Wet well rehabilitation, new ladder	8	11	20					24					
5	e, f) Wet well rehabilitation, repair spalled concrete	8	11	21					26					
6	d.) Wet well rehabilitation	8	11	18					22					
8	d,e,f.) Wet well rehabilitation, repair spalled concrete	8	11	24					29					
11	f, g) Wet well rehabilitation	8	11	43					52					
13	f, g.) Wet well rehabilitation, new ladder	8	11	16					19					
15	d, e, f, g) Wet well rehab, conc repair, new ladders	8	11	27					33					
17	g, h.) Wet well rehabilitation, ladder replacement	8	11	22					27					
6	e.) Additional wet well	6	8	34						43				
25	d.) Additional wet well	6	8	286						362				
3	e.) Replace force main	6	9	39						49				
4	g.) Replace force main	6	9	25						32				
8	g.) Replace force main	6	9	60						76				
12	a.) Abandon / Construct pipeline	6	14	46						58				
18	a.) Abandon / Construct pipeline	6	14	78						99				
19	a.) Abandon / Construct pipeline	6	14	169						214				
22	a.) Abandon / Construct pipeline	6	14	221						280				
NCI	Rehabilitate manholes on VCP gravity segment	6	20	130						164				
NCI	Construct manholes on FRP pipe gravity segment	6	21	210						266				
1	f.) Replace pumps/motors	4	5	26		28								
3	d.) Replace pumps/motors	4	5	21	22									
4	f.) Replace pumps/motors	4	5	26	27									
7	g.) Replace pumps/motors	4	5	26	27									
9	d.) Replace pumps/motors	4	5	26									37	
23	c.) Replace pumps/motors	4	5	21				25						
24	c.) Replace pumps/motors	4	5	34								47		
25	f.) Replace pumps/motors (constant speed units)	4	5	254										376
26	g.) Replace pumps/motors (constant speed units)	4	5	345										511
1	g.) Install 4" pumping tee	4	10	3							4			
2	f.) Install 6" pumping tee	4	10	3							4			
5	g.) Install 4" pumping tee	4	10	3							4			
6	f.) Install 6" pumping tee	4	10	3							4			
7	h) Install 4" pumping tee	4	10	3							4			
9	e.) Install 6" pumping tee	4	10	3							4			
10	b.) Install 4" pumping tee	4	10	3							4			
13	h.) Install 6" pumping tee	4	10	3							4			
16	d.) Modify stairway	4	10	5							7			
16	g.) Install 4" pumping tee	4	10	3							4			
21	g.) Install 4" pumping tee	4	10	3							4			
23	d.) Install 4" pumping tee	4	10	3							4			
24	d.) Install 8" pumping tee	4	10	4							5			
26	f.) Extend monorail	4	10	39							51			
21	d, e) Wet well rehabilitation, new ladder	4	12	16							21			
NCI	Rehabilitate ACP force main from Laguna LS	2	22	850								1,163		
NCI	Rehabilitate ACP force main from Bluebird LS	2	23	1,510									2,149	
	TOTALS:			12,436	5,459	1,489	394	379	836	1,643	128	1,210	2,244	887
	Inflation coefficient:				1.0400	1.0816	1.1249	1.1699	1.2167	1.2653	1.3159	1.3686	1.4233	1.4802

All costs are inflated at 4%/year.

CITY OF LAGUNA BEACH
LIFT STATION PROJECTS
TABLE 1-6

Project No.	Description	CIP No.	2003 Project Cost ($1,000)
1	Electrical work for code compliance	1-1	226
2	Gas detection system in wet well (code compliance)	2-1	360
3	Electrical relocations/replacement	3-4	93
4	Replace pump/motor, LS # 16, 25, 26	4-1	625
4	Replace pump/motor, LS # 17	4-4	29
4	Replace pump/motor, LS # 10, 21	4-9	41
5	Replace pump/motor, LS #3, 4, 7	5-1	73
5	Replace pump/motor, LS #1	5-2	26
5	Replace pump/motor, LS #23	5-4	21
5	Replace pump/motor, LS #24	5-8	34
5	Replace pump/motor, LS #9	5-9	26
5	Replace pump/motor, LS #25, 26	5-10	599
6	Provide additional wet well capacity , LS #16, 26	6-5	475
7	Provide additional wet well capacity , LS #11, #24	7-4	179
8	Provide additional wet well capacity, LS #6, 25	8-6	320
9	Replace force main, LS #3, 4, 8	9-6	124
10	Misc. work, LS#1, 2, 5-7, 9, 10, 13, 16, 21, 23, 24, 26	10-7	81
11	Rehab wet well, LS #1, 2, 5, 6, 8, 11, 13, 15, 17	11-5	212
12	Rehab wet well, LS #21	12-7	16
13	Rehabilitate LS #14, elec standby at LS#13	13-1	801
14	Abandon LS #12, 18, 19, 22	14-6	514
15	Install standby generator, LS #1, 5, 7, 17, 21	15-3	351
16	NCI - Rehabilitate siphon at Nyes Place	16-1	400
17	NCI - Parallel Laguna LS ACP force main	17-1	1,340
18	NCI - Parallel Bluebird LS ACP force main	18-1	2,220
19	NCI - Relocate gravity siphon within Aliso Creek	19-2	550
20	NCI - Rehabilitate manholes in VCP pipe gravity segment	20-6	130
21	NCI - Construct manholes in FRP pipe gravity segment	21-6	210
22	NCI - Rehabilitate ACP force main from Laguna LS	22-8	850
23	NCI - Rehabilitate ACP force main from Bluebird LS	23-9	1,510
		Total:	**12,436**

Note: For CIP No. , first number is project number, second is the year for construction.

PART 2
LIFT STATIONS ASSESSMENT

2.0 Background

The City of Laguna Beach (City) sewer system currently has 26 sewage lift stations. The number of stations is due to the need to pump waste from homes and businesses below gravity flow areas, such as the area west of Pacific Coast Highway and in canyons. Stations were added as the City developed; some date back to the 1930's. Refer to Figure 1 for a map showing the station locations.

Sewage lift stations represent a continual maintenance requirement; following is a schedule for typical maintenance activities:

- Inspect lift stations on average two times a week to check pump run times, alarm lights on electrical panels, exhaust systems, and Bioxide metering systems.
- The two SOCWA Lift Stations are checked daily and standby pumps are exercised weekly.
- Bioxide deliveries for odor mitigation are made monthly.
- Two wet wells are cleaned each month, so all wet wells except the SOCWA stations are cleaned annually.
- Generators are exercised monthly.
- On an annual basis, the following equipment is reviewed and maintained:

  Control panel
  Pumps
  Check valves
  Wet wells
  Remote telemetry units (RTU)
  Generators

In spite of these efforts, lift stations are susceptible to sewage spills. These are caused by various reasons, such as power failure, high flows due to upstream flooding into the sewer system, construction errors, line breaks, etc.

In September, 2002, the US Environmental Protection Agency (EPA) issued a Finding of Violation and Order for Compliance, requiring the City to take remedial measures to reduce the number of spills from its collection system. The EPA's NPDES Compliance Evaluation Report noted eight spills at or associated with lift stations. Three were caused

at least partially by lift station inadequacies; one was due to a power failure, two were from high flows due to upstream flooding or clearance of a blockage.

2.1 Scope

In September 2002, the City hired Boyle Engineering Corporation (Boyle) to assess the condition of the lift stations, develop a list of recommended improvements, determine the costs of the improvements, and rank the improvements in order of importance.

Several stations have been identified for possible abandonment. This would involve rerouting of incoming flows to an adjacent sewer. Each of these stations was reviewed in detail for the feasibility of abandonment. Plans for the abandonment of the Laguna Canyon Lift Station (#20) have been prepared; this station was not inspected in detail for upgrades.

2.2 Lift Station Investigations

2.2.1 General

In December, 2002 a team of Boyle engineers visited each lift station to review existing conditions. As mentioned previously, the City has 26 lift stations; see Figure 2-1 for a location map. Table 2-1 is a summary of the stations, indicating the year of construction of the station, force main, pump installation, and vent fan; and status of generators. Installation dates were provided by the City. Notes on observations at each station are included in Appendix A. Appendix B contains photos of each station.

2.2.2 Modification Plans

The City has prepared plans for the abandonment of Lift Station #20 (Laguna Canyon). This station was not evaluated with regard to improvements, since the abandonment is scheduled for completion in the Spring of 2003.

Plans and specifications have been prepared been for rehabilitation of Fairview #14 (Shaw's Cove); this contract includes an engine-generator unit which will also extend standby electrical service to Lift Station #13 (Fisherman's Cove). The City has requested a review of these plans with respect to meeting the criteria established for this assessment.

2.2.3 Evaluation Criteria

Several evaluation criteria were established for this lift station assessment. The following items were reviewed with regard to condition:

General:

- Operator safety issues. This includes ease of access to below-grade portions of the station and lack of adequate ventilation.
- Ease of equipment access and removal. When necessary, mechanical equipment must be able to be removed from the station and transported to a point of loading to a truck; this is somewhat dependent on the size of the equipment and distance to where the truck is able to park.

Structural:

- Concrete in the wet well. Hydrogen sulfide gas in a moist environment will corrode concrete. Generally, the wet wells were not PVC-lined when originally constructed; many have subsequently been coated to protect the concrete.
- Condition of ladders and stairs. Long-term exposure of metals to a moist environment and hydrogen sulfide gas results in serious corrosion of ladders. Ladders must conform to provisions of OSHA regarding accessibility.

Electrical:

Evaluation of the existing stations is based on the following codes:

1996 National Electric Code (NEC)

National Fire Protection Association Standard for Fire Protection in Wastewater Treatment and Collection Facilities 1995 Edition (NFPA 820)

California Code of Regulations Title 8, Division 1, Chapter 4, Subchapter 5 Section 2540.10 Wastewater Wells (Title 8)

Common Deficiencies

There are several deficiencies that have been found to be common throughout the majority of the lift stations surveyed. The following paragraphs summarize these common deficiencies.

Conduit Seals (Code Violation)

A few of the lift stations do not have conduit seals between the wet well and dry well. Per NEC Article 500, a conduit seal is required for each conduit run leaving a Class I, Division 1 location. A seal should be installed either inside the wet well or inside the dry well.

Combustible Gas Detection System

None of the wet wells contain a combustible gas detection system. Per the latest version of NFPA 820, a combustible gas detection system

should be installed to sense air in the wet well and interface with the existing RTU system.

Dry Well

NFPA 820 requires the dry well to be classified as Class I Division 2 with no ventilation and unclassified if it is continuously ventilated at six air changes per hour. No combustible gas detection is required in the dry well by NFPA 820.

Other Items

Corrosion. Due to the proximity to moist salty air along the coast, many electrical components are susceptible to corrosion. This will affect the continuity of electrical circuits and could cause short-circuits and electrical failure.

Wiring. Insulation should be continuous, with no bare electrical wiring. Heat could make the insulation brittle, compromising it's insulation properties.

Engine/generator units. With the exception of Stations #25 and #26, which are diesel-powered, all engines are natural-gas powered. General conditions were noted.

Mechanical:

- Pumps and motors. Due to the susceptibility of flooding of the pump room, most pump/motor units have been replaced with submersible equipment. Because of their critical nature, this equipment should be scheduled for replacement at the end of it's useful life, assumed at 20 years.
- Wet well retention. See discussion below.
- Ventilation system. The ventilation system provides fresh air into the station for operator safety and to cool pump motors. A typical standard (NFPA 820) is to provide six air changes per hour for the station drywell. Nearly all stations have inadequate or inoperable ventilation systems.

Piping:

- Force mains: These pipelines are generally full of liquid, and are not subject to hydrogen sulfide attack. Age and material are a concern. Input from maintenance staff was obtained with regard to history of leaks and other problems.
- Bypass tee: If the lift station requires shut-down for extensive piping or pump work, it would be necessary to bypass flows around the station. A tee in the force main near the lift station is suggested at all stations.

2.2.4 Wet Well Retention

A failure of the pumps (due to an electrical outage or motor failure) will create a failure signal, which is sent to central via the SCADA system. Incoming sewage flow will accumulate in the wet well until it is full and overflows. The time between the pump shutdown and overflow is estimated based on remaining volume in the wet well and the rate of inflow; this is referred to as the retention time. Similar-size agencies have a criterion of storing peak inflow for a 45-minute retention time; this gives maintenance personnel time to travel to the lift station and take action to restore the station's lift ability.

The retention time analysis is based on the following assumptions:

- Failure occurs when the wet well water surface is at it's highest elevation. This value is estimated as the high bubbler depth plus six inches (height of bubbler outlet above the bottom of the wet well).
- The peak inflow is based on the average monthly flow rate, per 2002 record data. The average flow is peaked using the relationship developed by the Orange County Sanitation District:

  $Q_{peak} = 3.0 * Q_{avg}^{0.89}$, where flow is in gallons per minute
- Overflow will occur when the inflow reaches the top of the wet well.
- Analysis does not consider storage in upstream sewers.

Table 2-2 is a summary of the calculated retention times for each lift station. This analysis indicates that several wet wells have insufficient retention times.

Retention time less than 10 minutes:	#16
Retention time between 10-20 minutes:	**#11, #24**
Retention time between 20-45 minutes:	**#6, #25**

If all lift stations were to meet the minimum retention criteria, additional wet well storage volume would be required. The stations indicated in bold above have standby engine-generator units, enabling these stations to operate in case the problem is an electrical outage. Station #13 is scheduled to be provided standby electrical service from the proposed Station #14 improvements. Additional wet well storage is not a high priority for these stations.

Several stations, as a last resort when overflow occurs, will fill the pump room or other adjacent structure, as follows:

- #5: Overflow will be to the dry well. The increase in storage volume will extend retention time to about 169 minutes.
- #8: Overflow will be to the dry well. The increase in storage volume will extend retention time to about 53 minutes.
- #9: Overflow is to an abandoned wet well, then the dry well. Revised retention time is about 70 minutes.

Additional wet well storage should include the following features:

- Off-line storage will be connected to the wet well by an overflow pipe located above the high wet well water level. The top of the storage tank will be at or below the wet well overflow elevation.
- The storage facility will either be vertical reinforced concrete pipe (RCP) or a reinforced concrete structure. To resist corrosion, interior surfaces should be PVC lined.
- When the station pumping capability has been restored, the storage facility will be emptied by installation of a submersible

pump to transfer sewage back to the wet well. A permanent sump pump will be provided to transfer the last of the volume.

- The top of the structure will be provided with an access hatch for placement of the transfer pump, and a hatch for personnel access to wash down the tank interior and for ventilation.

Table 2-2 identifies the required additional wet well storage volume to meet the 45-minute retention criterion, and describes the recommended facilities to provide these volumes.

The storage facility should be located as close as possible to the lift station. The site for Station #26, on the corner of Glenneyre and Caliope, is very congested. It appears that a possible location may be easterly of the station, in the abandoned right-of-way for Galen Drive.

2.2.5 Pumps and Motors

As noted earlier, since pumping units are the critical pieces of equipment, we suggest that they be scheduled for replacement every 20 years; this is the assumed useful life. The need for scheduling replacements may be modified by considering the critical nature of the pumps at a lift station. For example, replacement at a station with a single pump (Station #10, for example) is probably more urgent than replacing pumps at Stations #25 or #26, which have four pumps, one or two of which are able to handle the peak flow. On the other hand, pumps at those two stations are not submersible types. The two variable-speed (VS) pumps have many hours of run time; the two constant speed pumps hardly have any run times. In this situation, we are recommending immediate replacement (a risk rating of 16 has been assigned) of the two VS pumps with submersible types, enabling continued operation if the pump room is ever flooded. Replacement of the other two pumps would become a less urgent matter, especially considering their lack of use.

In Section 3 of this report, the Laguna SOCWA and Bluebird SOCWA force mains are being recommended for construction of parallel lines. Depending on the alignment, the head condition could change. Prior to selecting replacement pumps, the hydraulics of the discharge piping should be investigated to determine pumping head conditions.

Pumps operate over a relatively short range in wet well level. This range is defined by the difference between the "pump start" and

"pump stop" levels. The time it takes to pump the wet well storage volume (working volume) within this range is a function of the pump capacity. For stations with a small working volume and a high capacity pump, the pump run time will be short. In response to incoming sewage flows, constant-speed pumps will be cycled on and off. Excessive start/stop cycles will shorten the life of the motor.

At each station (except #10 and #12) the SCADA system keeps track of the pump starts. The Nyes Place Lift Station (#24) had over 3,000 starts per pump in November 2002, which means that a pump was started every 7-8 minutes. Suggestions have been offered that to reduce the number of starts, variable speed drives (VFDs) could be added to match the pump discharge to the inflow, or pump impellers could be modified to reduce the pump capacity. In reviewing this station, we suggest that the "pump on" wet well level be increased from the present 43" to 72", a 116 percent increase in working storage. For the same flow conditions, pump starts should be able to be reduced to less than 1,400 per month. This higher wet well level will not affect upstream gravity sewers. The suggested additional wet well storage is still appropriate.

Two other stations with a high number of pump starts are Anita Street (#8) with 2,780 and Main Beach (#11) with 2,500. We suggest that a similar review be made for these stations.

2.2.6 Force Mains

Several force mains are old, one in excess of 70 years. According to maintenance staff, replacements are planned in the next couple of years for the following stations: #3, #4, #8, #12.

Bypass tees are recommended as a low-cost improvement to facilitate temporary bypassing of sewage flow around the station. The only stations with tees are #11, #15, #17, #18, #25, and #26; all others should be retrofitted.

2.2.7 Emergency Generators

To ensure the ability to continue pumping during an electrical outage, standby emergency generators are suggested at several additional locations. This will relieve maintenance staff from transporting portable generators to a station, and will be especially useful if the

electrical outage is over a large area, shutting down several lift stations.

We have assumed the engine generator unit will be located in a building. The following additional generators are suggested:

- Station #1 (Victoria Beach #1). Extend electrical service to Station #2, a distance of about 400 feet.
- Stations #5, #7, #17, and #21.
- As noted earlier, plans for emergency power at Stations #13 and #14 have been prepared.

With several stations being recommended for abandonment, this will leave only Stations #3, #4, #10, and #16 without standby power. These are not recommended because these are small stations with low flows. In addition, the City does have a portable generator unit, which could be used.

2.2.8 Lift Station Abandonments

Several stations have been identified as possible candidates for abandonment; each of the potential abandonments was investigated. Topographic data for this analysis were provided by the City. Following is a summary of these findings:

Lift Station #11 (Main Beach). Problems with this station include extensive wet well concrete corrosion, corrosion of the generator and some electrical equipment, and difficulty with equipment removals with the lifeguard station overhead. The station itself dates from 1958; pumps and force main are relatively new. Bioxide is applied at this location.

Abandonment was studied in conjunction with the planned reinforced concrete box storm drain construction in Broadway (*Sewer Improvement Design Study*, Moffat & Nichol, May 2002). Several alternatives were investigated; all required either the existing lift station, or another station in a different location. We understand that this storm drain will not be constructed.

We reviewed an alternative considered in the above report, regarding relocation of LS #11. Sewers in the area between Stations #11 and

#25 were reviewed. Based on existing sewer elevations, it is not possible to reroute the sewage flow by gravity from Station #11 to Station #25. Station #11 could be eliminated by construction of a new lift station near Station #25, similar to that described as Alternative 2B in the previous study. Rerouting of flows to a new lift station near #25 would require a 12-inch sewer, about 2,200 feet long. Possible routing will be easterly along Coast Highway to the alley north of Broadway, then down an alley opposite Beach Street, to Broadway, then proceeding northerly along Broadway to Station #25. Because of the deep pipeline (40 feet at the new lift station), microtunnelling or directional drilling should be considered

The wet well for the new station will be sized to provide emergency storage. The maximum allowable storage level should be elevation 8.0; this will avoid spillage at the upstream sewer at Broadway/Coast Highway. Discharge will be to the NCI. via two variable-speed pumps, each sized to deliver a peak flow of 345 gpm. With an operating wet well level at elevation (-)10 feet and a discharge HGL of 92, the pump motor sizes will be 15 horsepower. As noted in the prior report, the existing electrical system and engine-generator unit will be able to provide power to this station. The recommended configuration for the new station is two interconnected 9-foot diameter RCP's, about 50 feet deep, each with a submersible pump.

With a total cost of over one million dollars, we do not recommend relocation of LS #11 at this time. Instead, it should be maintained and rehabilitated as necessary. If and when it becomes necessary to reconstruct the existing station, the economics of doing so at the existing or another site can be investigated at that time.

Lift Station No. 12 (Heisler Park). This station serves a restroom along the beach. It consists of a single pump in a wet well. The station is not a part of the City's SCADA system, so failure is not alarmed. It appears that the flow could be rerouted by gravity from the wet well to Lift Station #13 (Fisherman's Cove). An 8-inch PVC sewer, about 400 feet long, could be routed along Cliff Drive between the stations. The approximate construction cost would be $35,000.

Lift Station #18 (Santa Cruz). The station is located on Santa Cruz, west of Bluebird Canyon. Sewage flows to the wet well could be diverted southerly, across presently undeveloped properties, and discharge to the existing system on Palmer Place, north of Catalina.

The diversion would consist of about 600 feet of 8-inch PVC pipeline. Refer to Figure 2-2 for the proposed pipeline alignment. The alignment was selected to avoid a siphon. The approximate construction cost is estimated at $60,000.

Lift Station #19 (Bernard Court). This station is located in the backyard patio of a residence on Bernard Court, westerly of Laguna Boulevard. Flow could be diverted southerly to the sewer system in Morningside Drive. The alignment is steep and undeveloped. Construction would involve installation of about 1,100 feet of 8-inch PVC pipeline. Refer to Figure 2-3 for the pipeline plan. The approximate construction cost is $130,000.

Lift Station #20 (Laguna Canyon). As previously noted, abandonment of this station is to be completed in Spring 2003.

Lift Station #22 (Arch Beach Heights). The station is located on Oro, south of Capistrano. Wet well flow could be diverted southerly to the sewer system in Nyes Place. This would involve construction of about 1,600 feet of 8-inch PCV pipe. See Figure 2-4 for the pipeline plan. The pipe slope is continuously downward, but the upper 400 feet or so crosses a canyon. This pipe should be installed with additional depth, and probably be concrete-encased for protection from erosion. The approximate construction cost is $170,000.

Typical lift station maintenance activities are described in Section 2.0 of this report. In fiscal year 2002-03, the sewer fund had a budget of about $3.4 million, exclusive of capital improvement projects. Assuming lift station maintenance accounted for 40 percent of this budget, the average annual cost per station would be $52,000. For small stations, this cost may be closer to $20-25,000 per year. Any time a station can be removed from the sewage system, it would be desirable to do so, if practically and economically feasible. Removal of a lift station would also increase system reliability. For these four possible abandonments, the pay back period varies from two to eight years. We recommend that these stations be scheduled for abandonment.

2.2.9 Review of Rehabilitation Plans for Lift Station #14

At the City's request, we have reviewed construction drawings for the proposed rehabilitation of Station #14. Plans were prepared by PRP

Engineering, Inc., and are dated September 2001. Following are our observations and suggestions:

- A combination of storage within the wet well and the overflow basin will provide a retention time of about 94 minutes, meeting the City's criterion.
- Plans indicate the wet well and overflow basin are to be lined with Sancon; we suggest that a PVC liner system be used.
- Per NFPA 820 and California Title 8, the electrical equipment in the dry well should either be rated Class I, Division 2, or the electrical power has to be shut off in case of fan failure and if a gas alarm is activated. Gas detection and fan failure signals are sent to the RTU but the RTU does not signal the MCC to shut power off.

The construction cost for this work is estimated at $697,000. This cost has been increased 15% for a project cost of $801,000.

2.2.10 Structural and Electrical Rehabilitation

In order to maintain the lift stations in good working order and extend their useful life, the following items of work are recommended. The need for these items was determined based on conditions observed during the inspection of each station.

Structural

As noted in Appendix A, corrosion of the wet wells was observed to vary from minor to severe. Concrete surfaces having "minor" corrosion exhibited loss of some areas of the surface mortar and only an insignificant amount of aggregate was exposed. Concrete that was observed to have "severe" corrosion had large areas of exposed concrete aggregate and some loss of overall concrete thickness. All of the wet wells were coated to varying degrees by grease, coatings, and other materials that obscured the observance of the concrete surfaces. When the wet wells are rehabilitated, additional or more severe deterioration of the concrete may be observed. The need for more extensive remediation may become apparent at that time.

The recommended remediation of the corroded wet wells is the application of a pvc liner system to both the walls and ceiling. After dewatering the wet well, the surfaces would be sandblasted to bare

concrete. If necessary, an epoxy grout should then be applied to provide a smooth surface, and then coated with a mastic epoxy primer recommended by the liner manufacturer. The liner is anchored by installing it on the epoxy mastic primer. Heat-welding or adhesively bonding pvc strips joins the seams in the pvc liner. This system has provided good long-term results in protection of sewer-wet wells. Products such as Arrow-Lock by Ameron, and Linabond by Linabond, Inc. are example of such systems.

Electrical

To comply with the requirements of NFP 820, gas detection shall be added to the wet wells.

Depending on the severity of problems at each station, the following may also be required:

1. Replace corroded electrical equipment.
2. Provide explosion-proof seals for conduits entering or leaving explosion-proof areas.

2.2.11 Findings and Recommended Improvements

A summary of the recommended improvements is listed in Table 2-3.

CITY OF LAGUNA BEACH
SEWER LIFT STATION ASSESSMENT SUMMARY
TABLE 2-1

LIFT STATION		YEAR	FORCE MAIN			PUMPS		VENT FAN		GENERATOR	
NO.	NAME	CONSTR	DIA	MAT'L	YEAR	NO.	YEAR	Y/N	YEAR	Y/N	YEAR
1	Victoria Beach #1	1932	4	PVC	1993	2	1985	Y	1992	N	
2	Victoria Beach #2	1932	6	CIP	1972	2	1995	Y	1990	N	
3	Rockledge	1932	4	CIP	1932	1	1981	N		N	
4	Millers	1932	4	CIP	1975	2	1982	N		N	
5	Pearl Street	1958	6	PVC	1998	2	1994	N		N	
6	Bluebird Cyn.	1958	6	PVC	1986	2	1996	Y	1998	Y	1991
7	Brooks Street	1932	4	PVC	1999	2	1982	Y	1989	N	
8	Anita Street	1958	6	ACP	1950	2	1999	Y	1985	Y	1991
9	Cleo Street	2000	6	PVC	1998	2	1992	Y	1985	Y	1991
10	Animal Shelter	1988	4	PVC	1988	1	1992	N		N	
11	Main Beach	1958	6/8	CIP	2001	3	1997	Y	1997	Y	1989
12	Heisler Park	1963	4	CIP	1963	1	1982	N		N	
13	Fisherman's Cove	1948	6	PVC	1982	2	1999	Y	1999	N	
14	Fairview	1948	6	PVC	1998	2	1999	Y	1999	N	
15	Crescent Bay	1948	6	PVC	1998	2	2001	Y	1998	Y	1991
16	McKnight	1957	4	CIP	1980	2	1980	N		N	
17	Irvine Cove	1961	6	ACP	1961	2	1987	Y	1989	N	
18	Santa Cruz	1961	4	PVC	1989	1	1989	N		N	
19	Bernard Court	1961	8	ACP	1961	2	1988	Y	1988	N	
20	Laguna Canyon	1960	6	ACP	1989	2	1985	Y	1985	N	
21	Bonn Drive	1964	4	PVC	1999	2	1992	Y	1964	N	
22	Arch Beach Heights	1994	6	ACP	1970	2	1994	N		Y	1994
23	Old Top of the World	1987	4	PVC	1987	2	1987	N		Y	1987
24	Nyes Place	1991	8	PVC	1991	2	1991	Y	1991	Y	1991
25	Laguna SOCWA	1982	24/27	RCP/FG	1981	4	1982	Y	1994	Y	1981
26	Bluebird SOCWA	1982	24/27	FG	1981	4	1982	Y	1994	Y	1981

CITY OF LAGUNA BEACH
SEWER LIFT STATION RETENTION TIME ANALYSIS
TABLE 2-2

LIFT STATION NO.	NAME	WET WELL PLAN DIMENSIONS (ft.)		BUBBLER RANGE (in.) LOW	HIGH	WET WELL ELEVATION (ft.) BOTTOM	MAX OP ELEV [1]	MAX ALLOW [2]	EMERGENCY STORAGE VOLUME (cu. ft.)	(gal.)	AVERAGE ANNUAL FLOW IN 2002 (gpd)	(gpm)	PEAK FLOW (gpm)	WET WELL RETENTION TIME (min.)	REQ'D EXTRA VOL FOR 45 MIN RETEN (gal)	(cu ft)	COMMENTS
1	Victoria Beach #1	10.7	3.3	10	25	8.5	11.1	21.5	368	2,750	27,968	19.4	46	60			
2	Victoria Beach #2	10.7	3.3	10	25	43.5	46.1	51.3	184	1,380	18,817	13.1	32	43	64	9	Ignore additional volume
3	Rockledge	9.0	7.5	8	24	50.0	52.5	58.5	405	3,030	4,485	3.1	9	355			Wet well is a fiberglass tank [3]
4	Millers	9.0	7.8	12	36	33.6	37.1	39.6	176	1,310	2,063	1.4	4	314			
5	Pearl Street	10.7	3.3	12	30	31.0	34.0	39.0	177	1,320	22,989	16.0	38	34	422	56	OK-Overflow is to the dry well [4]
6	Bluebird Cyn.	10.7'x3.3' + 9.7'x7.7'		10	30	30.0	33.0	38.5	605	4,530	82,876	57.6	125	36	1,124	150	Use 6' diam. RCP, 8' deep
7	Brooks Street	9.0	7.5	14	24	11.0	13.5	19.5	405	3,030	4,507	3.1	9	354			Wet well is a fiberglass tank [3]
8	Anita Street	10.7	3.3	14	36	0.0	3.5	8.0	159	1,190	78,686	54.6	119	10	4,166	557	OK-Overflow is to the dry well [5]
9	Cleo Street	10' Dia		24	84	0.0	7.5	15.0	589	4,410	113,453	78.8	167	26	3,167	423	Overflow is to the abandoned wet well and dry well [6].
10	Animal Shelter	4' Dia		10	55	0.0	5.1	11.0	74	560	8,816	6.1	16	35	159	21	Ignore additional volume
11	Main Beach	17.0	7.3	12	30	-1.3	1.7	8.5	844	6,310	250,044	173.6	345	18	9,310	1,245	Use 2-10' diam. RCP, 8' deep
12	Heisler Park	5' Dia		8	38	0.0	3.7	8.0	85	640	934	0.6	2	318			
13	Fisherman's Cove	10.7	3.3	14	38	0.0	3.7	8.0	153	1,140	13,577	9.4	24	48			
14	Fairview	10.7	3.3	20	50	0.0	4.7	8.0	118	880	44,910	31.2	71	12	2,345	313	Scheduled for rehabilitation [7]
15	Crescent Bay	10.7	3.3	20	50	0.0	4.7	11.7	248	1,860	19,836	13.8	34	56			
16	McKnight			30	45	0.0	4.3		-	-	887	0.6	2	-	86	12	Currently no wet well; provide wet well storage. Use 5' dia. RCP, 4' long.
17	Irvine Cove	10.0	4.0	28	45	24.2	28.5	36.2	310	2,320	21,489	14.9	36	64			
18	Santa Cruz	5' Dia		10	30	0.0	3.0	8.0	98	730	2,810	2.0	6	132			
19	Bernard Court	8.0	4.0	5	30	0.0	3.0	15.5	400	2,990	3,568	2.5	7	433			
20	Laguna Canyon	(Not studied)									6,028	4.2	11	-	504	67	Scheduled for abandonment
21	Bonn Drive	11.0	4.0	10	40	0.0	3.8	17.2	588	4,400	35,758	24.8	58	76			
22	Arch Beach Heights	5' Dia + 6' Dia		12	54	582.7	587.7	596.5	422	3,150	35,379	24.6	57	55			
23	Old Top of the World	6' Dia		18	55	879.0	884.1	893.0	252	1,890	17,117	11.9	29	65			
24	Nyes Place	6' Dia		18	43	100.5	104.6	114.7	286	2,140	116,111	80.6	170	13	5,448	728	Use 2-8' diam. RCP, 8' deep
25	Laguna SOCWA	34.7	8.3	60	132	5.4	16.9	33.7	4,839	36,190	1,420,067	986.2	1,704	21	40,904	5,468	15' x 16' x 24' deep
26	Bluebird SOCWA	33.0	7.6	66	113	33.1	43.0	48.8	1,450	10,850	2,095,797	1,455.4	2,438	4	99,966	13,364	15' x 45' x 20' deep

[1] Elevation = Bottom of wet well + 6" (bottom of bubbler) + high bubbler setting.
[2] Elevation at which flow would leave the wet well.
[3] Overflow from small fiberglass tank will be to pump room, before overflowing the station.
[4] Dry well dimension is 8' x 10.7' x 8' high (5,100 gal cap.). Revised retention time is about 169 minutes.
[5] Dry well dimension is 8' x 10.7' x 8' high (5,100 gal cap.). Revised retention time is about 53 minutes.
[6] Abandoned wet/dry well is 10.7' x 11.3' x 8' high (7,240 gal cap). Total retention time is about 70 minutes.
[7] New wet well emergency storage is 10' x 8' x 5' high (2,990 gal cap), with retention time of 43 minutes
Considering the overflow basin, 10' x 7' x 7' high (3,670 gal cap), total retention time before overflow is 94 minutes.

CITY OF LAGUNA BEACH
SEWER LIFT STATIONS: RECOMMENDED IMPROVEMENTS
TABLE 2-3

LIFT STA NO.	PROPOSED IMPROVEMENT	JUSTIFICATION	2003 COST ($1,000) CONSTR	PROJECT
1	a.) Replace corroded electrical equipment	Corroded	3.0	4
	b.) Provide explosion proof seals for conduits entering or entering or leaving control panel	NEC 501-5	1.0	1
	c.) Provide gas detection sytem for wet well (Note that power panel is located outside and does not need to be de-energized) (Note that the control panel is outside and does not need to be relocated)	NFPA 820	10.0	13
	d.) Install generator unit. Extend electical service to LS #2 Provide 400' of conduit and wire to LS#2	Maintain pumping capability	70.0	91
	e.) Apply protective lining to wet well interior to resist further concrete corrosion	Corroded concrete	16.0	21
	f.) Replace pumps/motors, recoat rusty metals (2005)	End of useful life	20.0	26
	g.) Install 4" pumping tee	Allow station bypass	2.0	3
2	a.) Replace corroded electrical equipment	Corroded	3.0	4
	b.) Provide explosion proof seals for conduits entering or leaving instrumentation control panel.	NEC 501-5	0.5	1
	c.) Provide gas detection sytem for wet well, change lights and recptacles to class I, Division 2 in the dry well. (Note that power panel is located outside and does not need to be de-energized) (Note that the control panel is outside and does not need to be relocated)	NFPA 820	15.0	20
	d.) Apply protective lining to wet well interior to resist further concrete corrosion	Corroded concrete	14.0	18
	e.) Replace ladder with new SST ladder	Corroded steel ladder	1.5	2
	f.) Install 6" pumping tee	Allow station bypass	2.0	3
3	a.) Replace corroded electrical equipment	Corroded	3.0	4
	b.) Provide explosion proof seals for conduits entering or leaving dry well.	NEC 501-5	0.5	1
	c.) Provide gas detection sytem for wet well, change lights and recptacles to class I, Division 1 in the dry well. Class I, Division 1 electrical equipment is required since the wet well consists of a fiberglass enclosure and it is located in the dry well. (Note that power panel is located outside and does not need to be de-energized) (Note that the control panel is outside and does not need to be relocated)	NFPA 820	15.0	20
	d.) Replace pumps/motors (2004)	End of useful life	16.0	21
	e.) Replace force main (480' of 4" PVC pipe)	Deterioriated pipe	30.0	39
4	a.) Replace corroded electrical equipment	Corroded	3.0	4
	b.) Provide explosion proof seals for conduits entering or leaving dry well.	NEC 501-5	0.5	1
	c.) Provide, gas detection sytem for wet well, change lights and receptacles to class I, Division 2 in the dry well.	NFPA 820	15.0	20
	d.) Replace and locate power panel outside.	NFPA 820	15.0	20
	e.) Relocate control panel outside	NFPA 820	8.0	10
	f.) Replace pumps/motors (2004)	End of useful life	20.0	26
	g.) Replace force main (280' of 4" PVC pipe)	Deterioriated pipe	19.0	25

SEWER LIFT STATIONS: RECOMMENDED IMPROVEMENTS
TABLE 2-3

LIFT STA NO.	PROPOSED IMPROVEMENT	JUSTIFICATION	2003 COST ($1,000) CONSTR	PROJECT
5	a.) Replace corroded electrical equipment	Corroded	2.0	3
	b.) Provide explosion proof seals for conduits entering or leaving dry well	NEC 501-5	0.5	1
	c.) Provide gas detection system for wet well and provide Class I, Division 1 lights, receptacles and exhaust fans, in dry well. Class I, Division 1 electrical equipment is required since the wet well may overflow into dry well. (Note that power panel is located outside and does not need to be de-energized) (Note that the control panel is outside and does not need to be relocated)	NFPA 820	15.0	20
	d.) Install generator unit.	Maintain pumping capability	50.0	65
	e.) Apply protective lining to wet well interior to resist further concrete corrosion	Corroded concrete	14.0	18
	f.) Remove loose eave concrete and replace with new concrete.	Hazard to pedestrians	2.5	3
	g.) Install 6" pumping tee	Allow station bypass	2.0	3
6	a.) Replace corroded electrical equipment	Corroded	3.0	4
	b.) Provide explosion proof seals for conduits entering or leaving dry well	NEC 501-5	0.5	1
	c.) Provide, gas detection sytem for wet well, change lights and receptacles to class I, Division 2 in the dry well. Add exhaust fan and supply fan in drywell (Note that power panel is located outside and does not need to be de-energized) (Note that the control panel is outside and does not need to be relocated)	NFPA 820	18.0	23
	d.) Apply protective lining to wet well interior to resist further concrete corrosion	Corroded concrete	14.0	18
	e.) Additional wet well storage (6' dia RCP, 8' deep)	Avoid spill	26.0	34
	f.) Install 6" pumping tee	Allow station bypass	2.0	3
7	a.) Replace corroded electrical equipment	Corroded	2.0	3
	b.) Provide explosion proof seals for conduits entering or leaving dry well.	NEC 501-5	0.5	1
	c.) Provide gas detection system for wet well and provide Class I, Division 1 lights, receptacles exhaust fan in the dry well. Class I, Division 1 electrical equipment is required since the wet well consists of a fiberglass enclosure and it is located in the dry well.	NFPA 820	15.0	20
	d.) Replace and relocate generator transfer switch and power panel outside	NFPA 820	20.0	26
	e.) Install generator unit.	Maintain pumping capability	50.0	65
	f.) Relocate control panel outside	NFPA 820	8.0	10
	g.) Replace pumps/motors (2004)	End of useful life	20.0	26
	h.) Install 4" pumping tee	Allow station bypass	2.0	3

SEWER LIFT STATIONS: RECOMMENDED IMPROVEMENTS
TABLE 2-3

LIFT STA NO.	PROPOSED IMPROVEMENT	JUSTIFICATION	2003 COST ($1,000) CONSTR	PROJECT
8	a.) Replace corroded electrical equipment	Corroded	3.0	4
	b.) Provide explosion proof seals for conduits entering or leaving dry well.	NEC 501-5	0.5	1
	c.) Provide gas detection system for wet well and provide Class I, Division 1 lights, receptacles and exhaust fans, in dry well. Class I, Division 1 electrical equipment is required since the wet well may overflow into dry well. Add exhaust fan and supply fan in drywell (Note that power panel is located outside and does not need to be de-energized) (Note that the control panel is outside and does not need to be relocated)	NFPA 820	18.0	23
	d.) Remove loose eave concrete and replace with new concrete.	Hazard to pedestrians	2.5	3
	e.) Apply protective lining to wet well interior to resist further concrete corrosion	Corroded concrete	14.0	18
	f.) Remove loose concrete at first floor beam- patch with concrete	Missing concrete	2.5	3
	g.) Replace force main (550' of 6" PVC pipe)	Deterioriated pipe	46.0	60
9	a.) Replace corroded electrical equipment	Corroded	3.0	4
	b.) Provide explosion proof seals for conduits entering or leaving dry well	NEC 501-5	0.5	1
	c.) Provide, gas detection sytem for wet well, change lights and recptacles to class I, Division 2 in the dry well. (Note that power panel is located outside and does not need to be de-energized) (Note that the control panel is outside and does not need to be relocated)	NFPA 820	15.0	20
	d.) Replace pumps/motors (2012)	End of useful life	20.0	26
	e.) Install 6" pumping tee	Allow station bypass	2.0	3
10	c.) Provide gas detection sytem for wet well	NFPA 820	10.0	13
	a.) Replace pump/motor (2012)	End of useful life	5.0	7
	b.) Install 4" pumping tee	Allow station bypass	2.0	3
11	a.) Replace corroded electrical equipment	Corroded	2.0	3
	b.) Provide explosion proof seals for conduits entering or leaving the dry well.	NEC-501-5	0.5	1
	c.) Provide gas detection system for wet well	NFPA 820	10.0	13
	d.) Provide Class I, Division 1 electrical equipment in dry well, such as lights, receptacles, instrumentation control panel, and exhaust fan. **Class I, Division 1 is required since the wet well has a door which opens directly into the dry well.**	NFPA 820	12.0	16
	e.) Move generator and transfer switch outside of dry well.	NFPA 820	40.0	52
	f.) Relocate (2) control panels outside	NFPA 820	10.0	13
	g.) Apply protective lining to wet well interior to resist further concrete corrosion	Corroded concrete	30.0	39
	h.) Replace ladders with SST ladders (2)	Corroded ladders	3.0	4
	i.) Provide wet well storage (2-10' dia RCP, 8' deep)	Avoid spills	74.0	96
12	a.) Construct 400 of 6-inch PVC pipeline	**Abandon station**	35.0	46

SEWER LIFT STATIONS: RECOMMENDED IMPROVEMENTS
TABLE 2-3

LIFT STA NO.	PROPOSED IMPROVEMENT	JUSTIFICATION	2003 COST ($1,000) CONSTR	PROJECT
13	a.) Replace corroded electrical equipment	Corroded	3.0	4
	b.) Provide explosion proof seals for conduits entering or leaving dry well	NEC 501-5	0.5	1
	c.) Provide, gas detection system for wet well, change lights and receptacles to class I, Division 2 in the dry well.	NFPA 820	15.0	20
	d.) Replace and relocate power panel and generator transfer switch outside		20.0	26
	e.) Relocate control panel outside	NFPA 820	8.0	10
	f.) Apply protective lining to wet well interior to resist further concrete corrosion	Corroded concrete	11.0	14
	g.) Replace exist. dry well ladder rungs with SST ladder	OSHA non-compliance	1.5	2
	h.) Install 6" pumping tee	Allow station bypass	2.0	3
14	**Scheduled for rehabilitation**		697.0	801
15	a.) Replace corroded electrical equipment	Corroded	3.0	4
	b.) Provide explosion proof seals for conduits entering or leaving dry well	NEC 501-5	0.5	1
	c.) Provide, gas detection system for wet well, change lights and receptacles to class I, Division 2 in the dry well. (Note that power panel is located outside and does not need to be de-energized) (Note that the control panel is outside and does not need to be relocated)	NFPA 820	15.0	20
	d.) Apply protective lining to wet well interior to resist further concrete corrosion	Corroded concrete	15.0	20
	e.) Replace exist. dry well ladder rungs with SST ladder	OSHA non-compliance	1.5	2
	f.) Replace exist. wet well ladder with SST ladder	Corroded steel ladder	1.5	2
	g.) Repair masonry pilasters	Spalling	2.0	3
16	a.) Replace and relocate meter power panel and provide NEMA 4 enclosure	Panel corroded and subject to flooding	12.0	16
	b.) Provide, gas detection system for wet well, change lights and receptacles to class I, Division 2 in the dry well.	NFPA 820	15.0	20
	c.) Relocate control panel outside	NFPA 820	8.0	10
	d.) Raise top of stairwell walls to resist flooding	Stormwater floods stairwell	4.0	5
	e.) Provide wet well storage (5' dia RCP, 4' deep)	Avoid spills	15.0	20
	f.) Replace pumps/motors (2004)	End of useful life	20.0	26
	g.) Install 4" pumping tee	Allow station bypass	2.0	3
17	a.) Replace corroded electrical equipment	Corroded	3.0	4
	b.) Provide explosion proof seals for conduits entering or leaving dry well	NEC 501-5	0.5	1
	c.) Provide, gas detection system for wet well, change lights and receptacles to Class I, Division 2 in the dry well.	NFPA 820	15.0	20
	d.) Replace and relocate power panel and generator transfer . switch outside	NFPA 820	20.0	26
	e.) Install generator unit.	Maintain pumping capability	50.0	65
	f.) Relocate control panel outside	NFPA 820	8.0	10
	g.) Apply protective lining to wet well interior to resist further concrete corrosion	Corroded concrete	15.0	20
	h.) Replace exist. wet well ladder with SST ladder	Corroded steel ladder	1.5	2
	i.) Replace pumps/motors (2007)	End of useful life	22.0	29
18	a.) Construct 570 of 6-inch PVC pipeline	**Abandon station**	60.0	78
19	a.) Construct 1,200 of 6-inch PVC pipeline	**Abandon station**	130.0	169
20	**Scheduled for abandonment**			

SEWER LIFT STATIONS: RECOMMENDED IMPROVEMENTS
TABLE 2-3

LIFT STA NO.	PROPOSED IMPROVEMENT	JUSTIFICATION	2003 COST ($1,000) CONSTR	PROJECT
21	a.) Provide explosion proof seals for conduits entering or leaving dry well	NEC 501-5	3.0	4
	b.) Provide, gas detection system for wet well, change lights and receptacles to class I, Division 2 in the dry well.	NFPA 820	15.0	20
	c.) Install generator unit. (Note that power panel is located outside and does not need to be de-energized) (Note that the control panel is outside and does not need to be relocated)	Maintain pumping capability	50.0	65
	d.) Apply protective lining to wet well interior to resist further concrete corrosion	Corroded concrete	11.0	14
	e.) Replace exist. wet well ladder with SST ladder	Corroded steel ladder	1.5	2
	f.) Replace pumps/motors (2012)	End of useful life	26.0	34
	g.) Install 4" pumping tee	Allow station bypass	2.0	3
22	a.) Construct 1,600 of 6-inch PVC pipeline	**Abandon station**	170.0	221
23	a.) Provide explosion proof seals for conduits between wet well and bubbler control panel	NEC 501-5	0.5	1
	b.) Provide gas detection system for wet well	NFPA 820	10.0	13
	c.) Replace pumps/motors (2007)	End of useful life	16.0	21
	d.) Install 4" pumping tee	Allow station bypass	2.0	3
24	a.) Provide gas detection system for wet well	NFPA 820	10.0	13
	b.) Additonal wet well storage (2-8' dia RCP, 8' deep)	Avoid spill	64.0	83
	c.) Replace pumps/motors (2011)	End of useful life	26.0	34
	d.) Install 8" pumping tee	Allow station bypass	3.0	4
25	a.) Replace corroded electrical equipment	Corroded	3.0	4
	b.) Provide explosion proof seals for conduits entering or leaving dry well	NEC 501-5	0.5	1
	c.) Provide gas detection system for wet well	NFPA 820	10.0	13
	d.) Additonal wet well storage (15' x 16' x 24' deep structure)	Avoid spill	220.0	286
	e.) Replace two variable speed pumps/motors (2004)	End of useful life	195.0	254
	f.) Replace two constant speed pumps/motors (2013)	End of useful life	195.0	254
26	a.) Replace corroded electrical equipment	Corroded	3.0	4
	b.) Provide explosion proof seals for conduits entering or leaving dry well	NEC 501-5	0.5	1
	c.) Provide gas detection system for wet well	NFPA 820	10.0	13
	d.) Additonal wet well storage (15' x 45' x 20' deep structure)	Avoid spill	350.0	455
	e.) Extend outside monorail and provide truck access	Facilitate eqipment removal	30.0	39
	f.) Replace two variable speed pumps/motors (2004)	End of useful life	265.0	345
	g.) Replace two constant speed pumps/motors (2013)	End of useful life	265.0	345
		Totals:	**4,085.0**	**5,226**

LIFT STATION LOCATIONS ○

NO.	NAME
①	VICTORIA BEACH #1
②	VICTORIA BEACH #2
③	ROCKLEDGE
④	MILLERS
⑤	PEARL STREET
⑥	BLUEBIRD CANYON
⑦	BROOKS STREET
⑧	ANITA STREET
⑨	CLEO STREET
⑩	ANIMAL SHELTER
⑪	MAIN BEACH
⑫	HEISLER PARK
⑬	FISHERMAN'S COVE
⑭	FAIRVIEW
⑮	CRESCENT BAY
⑯	McKNIGHT
⑰	IRVINE COVE
⑱	SANTA CRUZ
⑲	BERNARD COURT
⑳	LAGUNA CANYON
㉑	BONN DRIVE
㉒	ARCH BEACH HEIGHTS
㉓	OLD TOP OF THE WORLD
㉔	NYES PLACE
㉕	LAGUNA SOCWA
㉖	BLUEBIRD SOCWA

2000' 1000' 0 2000' 4000'

SCALE IN FEET

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LIFT STATION LOCATION MAP

FIGURE 2-1

DWG: I:\L02_003\CAD\Design\Fig 2-1.dwg USER: mzeltner
DATE: Mar 14, 2003 9:47am XREFS: 11x17FIG-A C-RP-MAP IMAGES:

BLUEBIRD CANYON DRIVE

SANTA CRUZ STREET

8" PVC SEWER

5+00

DISCHARGE TO
EXIST. MANHOLE
STA 6+30±

PALMER PLACE

CATALINA STREET

EXIST. LIFT STATION #18
STA 0+00

CALIOPE STREET

100' 50' 0 100' 200'

SCALE IN FEET

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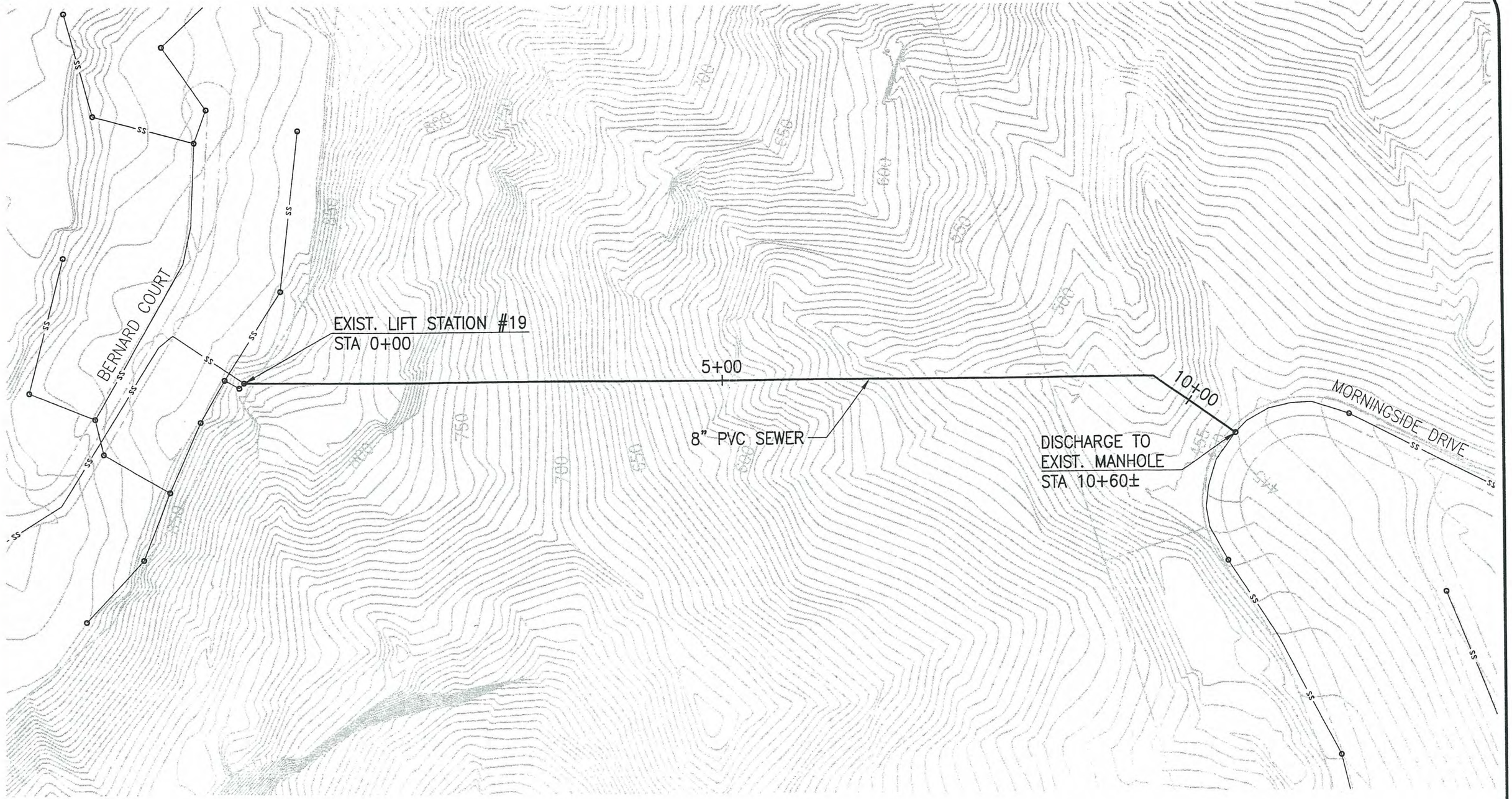
ABANDONMENT OF LIFT STATION No. 18

FIGURE
2–2

DWG: ..\L02\...\CAD\Design\FIG 2-2.dwg USER: mzeltner
DATE: Mar 20, 2003 10:54am XREFS: 11x17FIG-A C-RP C-UP C-RP-MAP IMAGES:



N

100' 50' 0 100' 200'

SCALE IN FEET

DWG: I:\L02\200\CAD\Design\FIG 2-3.dwg USER: mzeltner
DATE: Mar 20, 2003 11:13am XREFS: 11x17FIG-A C-RP-MAP C-RP C-UP IMAGES:

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ABANDONMENT OF LIFT STATION No. 19

FIGURE 2-3

EXIST. LIFT STATION #22
STA 0+00

ORO STREET

ALISOS AVENUE

CORTEZ AVENUE

5+00

10+00

15+00

8" PVC SEWER

DISCHAGE TO
EXIST. MANHOLE
STA 16+40±

NYES
PLACE

100' 50' 0 100' 200'
SCALE IN FEET

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ABANDONMENT OF LIFT STATION No. 22

FIGURE
2-4

DWG: ...\LO2\...\CAD\Design\FIG 2-4.dwg XREFS: 11x17FIG-A C-RP-MAP
DATE: Mar 20, 2003 11:12am USER: ...ueltner C-RP C-UP IMAGES:

PART 3
NORTH COAST INTERCEPTOR ASSESSMENT

3.1 Executive Summary

The City is totally dependent upon the North Coast Interceptor (NCI) system to transport all wastewater collected in that part of the city north of Nyes Place to the South Orange County Wastewater Authority Treatment Plant in Aliso Canyon for treatment and disposal. The NCI has been in operation for the past 22 years. The reliability of the NCI is critical.

This report summarizes the vulnerabilities of the NCI system to continued serviceability with deficiencies identified and analyzed. The report characterizes the NCI system on a segment by segment basis. Each reach is analyzed in order to identify vulnerabilities that could disrupt service. Alternatives to address the deficiencies are identified and solutions recommended.

The NCI is composed of two lift stations; two force mains, and two gravity reaches and a long gravity siphon. This report focuses on the pipeline system. Assessment of the lift stations is included as a part of the sewer lift stations assessment report.

The force mains are the portions of the NCI carrying the flow from the lift stations uphill to the two system high points where the flow transitions to gravity flow. Each is constructed of asbestos cement pipe (ACP), although they transition to the adjacent gravity pipe material a few hundred feet before the end of the force main. The force main from the Laguna Lift Station is 2,770 feet of 24" pipe and the force main from the Bluebird Lift Station is 5,000 feet of 27" pipe. The profiles of both force mains include at least one intermediate high point where air that is entrained in the flow collects and is released by automatic air release valves. The ensuing low points are locations where solids such as grit and small rocks can accumulate.

The gravity flow reach downstream from the Laguna Lift Station is comprised of 4,000 feet of vitrified clay pipe (VCP). It includes conventional manholes for access for maintenance and operation of the line. Flow is open channel (partially full) with the depth governed by the slope of the pipe. This reach does include one siphon where the pipe follows up and down a valley in the road. The siphon pipe will run full with velocities less than the adjacent partially full reaches, often resulting in the depositions of solids.

The gravity reach downstream of the Bluebird Lift Station consists of 5,500 feet of 27" fiberglass reinforced plastic pipe that for the most

part follows the Pacific Coast Highway. No manholes have been provided on this reach. It includes two siphons with air release valves at the downstream end. The siphon at Nyes Place is constructed of mortar lined steel pipe.

The final segment is a long 24" ACP gravity siphon. It begins at the Pacific Coast Highway where the NCI turns onto Country Club Road and continues 6,500 feet along and adjacent to Aliso Creek to the regional treatment plant. The alignment is within the Aliso Creek channel in the "throat" area adjacent to the hotel complex and then exits the channel proper as it enters the golf course. The reach functions as a long siphon with an intermediate high point.

The assessment considers the vulnerability of the NCI to the following:

Condition. The effects of the sewer atmosphere can be extremely corrosive. The vulnerability of the piping materials to deterioration is examined, although the ability to obtain physical evidence is difficult for the NCI.

Operation. The ability to operate and maintain the system was reviewed.

Reliability. The ability of the City staff to react to unusual or emergency situations affecting the NCI is reviewed.

The assessment considers the vulnerability of the NCI to such factors as blockage, odor, deterioration and damage.

Overall the analysis has identified the following significant findings:

Force Mains. Several steps were taken in an effort to obtain some physical evidence, such as pipe wall coupons (4" diameter cores of the pipe wall). However, there was a reluctance to obtain the coupons in view of the potential risk of exposing the pipeline to damage during the operation. Historically, ACP material has exhibited a tendency to deteriorate in sewer force main applications. However, **the greatest concern for the force mains is the lack of redundancy in the system to enable the sewage flows to be handled without spilling in the event of damage from such factors as corrosion deterioration, an earthquake or a contractor related accident.** This greatly reduces the reliability

of the NCI system and could result in a catastrophic spill, the cost of which could be very high not withstanding the other negative impacts to the community. Therefore, **it is recommended that a new parallel second barrel be constructed for each force main to substantially increase the reliability of these segments.** The existing ACP barrel should be rehabilitated to provide a long-term backup to the new barrel.

Vitrified Clay Pipe Gravity Segment. Being constructed of VCP with conventional sewer manholes spaced to allow easy access to sewer line makes this segment reliable. **Some rehabilitation work is recommended on the manholes to maintain their serviceability.**

Fiberglass Reinforced Plastic Pipe Gravity Segment. Since the FRP pipe has not experienced a failure to date, it is less likely to be structurally deficient. Currently, there are no manholes on this segment to access the pipe for maintenance or operation. Siphons normally require frequent cleaning and maintenance to avoid blockages from accumulated solids. **Since the siphon at Nyes Place has already exhibited some corrosion, it is recommended to rehabilitate this steel pipe siphon immediately. It is also recommended that manholes be added throughout this segment to facilitate maintenance and increase its reliability.**

ACP Gravity Siphon Segment. The portion of this segment that is located within the Aliso Creek "throat" area of the channel proper is subject to significant damage during a storm event. The top of the existing concrete protective encasement is exposed in areas. **The concern is that continued erosion of the creek bed could lead to failure of the pipe. Consequently, it is recommended that this reach be relocated out the creek.** Two alternative alignments are discussed for further investigation.

Summary of Recommendations

Following is a summary of recommendations, listed in order of priority:

1. Proceed immediately with rehabilitation of the steel pipe siphon at Nyes Place.

2. Proceed immediately with implementation of a second barrel for the force mains from both the Laguna and Bluebird Lift Stations.

3. Relocate the portion of the gravity siphon within Aliso Creek.

4. Rehabilitate the manholes on the VCP gravity segment downstream of the Laguna Lift Station Force Main.

5. Construct manholes on the FRP pipe gravity segment downstream from the Bluebird Lift Station.

6. Rehabilitate both existing ACP force mains.

The total estimated project cost for these improvements is $ 5,920,000

3.2 Introduction

3.2.1 Background

The North Coast Interceptor (NCI) system conveys all the wastewater collected within the City north of approximately Nyes Place to the South Orange County Wastewater Authority Treatment Plant in Aliso Canyon for treatment and disposal. The City is totally dependent on this transmission system for sewage disposal. As such, the reliability of the NCI is critical.

The City's 2002 Sewer System Strategic Plan recognized the importance of the NIC by recommending this assessment of the NCI.

3.2.2 Scope and Approach

The NCI system designed and constructed prior to 1980, is comprised of several differing conveyance elements. They include lift stations, force mains, and gravity sewer reaches. This study is to identify vulnerabilities to the continued serviceability of the NCI. Deficiencies were identified and alternatives to address the deficiencies developed and analyzed.

The approach to the assessment employed the following sequential step by step process:

1. Characterization of the components of the NCI system. This will describe the operational function of each element, the pipe material, age and historical account of any problems.
2. Establishment of the assessment criteria.
3. Analysis of each component for their respective vulnerabilities.
4. Identification, development, and analysis of alternatives to remedy deficiencies.
5. Development of recommended actions and improvements.
6. Preparation of an opinion of probable construction cost for the proposed improvements.
7. Prioritization of projects for implementation of recommended improvements.

3.3 Characterization of Components

3.3.1 General

The North Coast Interceptor (NCI) is a pipeline conveyance system comprised of two raw sewage lift stations, two sewer force main reaches, two gravity sewer reaches with relatively short siphons, and a long siphon discharging to the regional treatment plant in Aliso Canyon.

Figure 3-1 illustrates the alignment of the NCI from downtown Laguna Beach to the regional treatment plant in the Aliso Creek Canyon. Figure 3-2 is a profile of the NCI system and shows the pipe materials that make up each of the pipeline reaches.

3.3.2 Force Mains

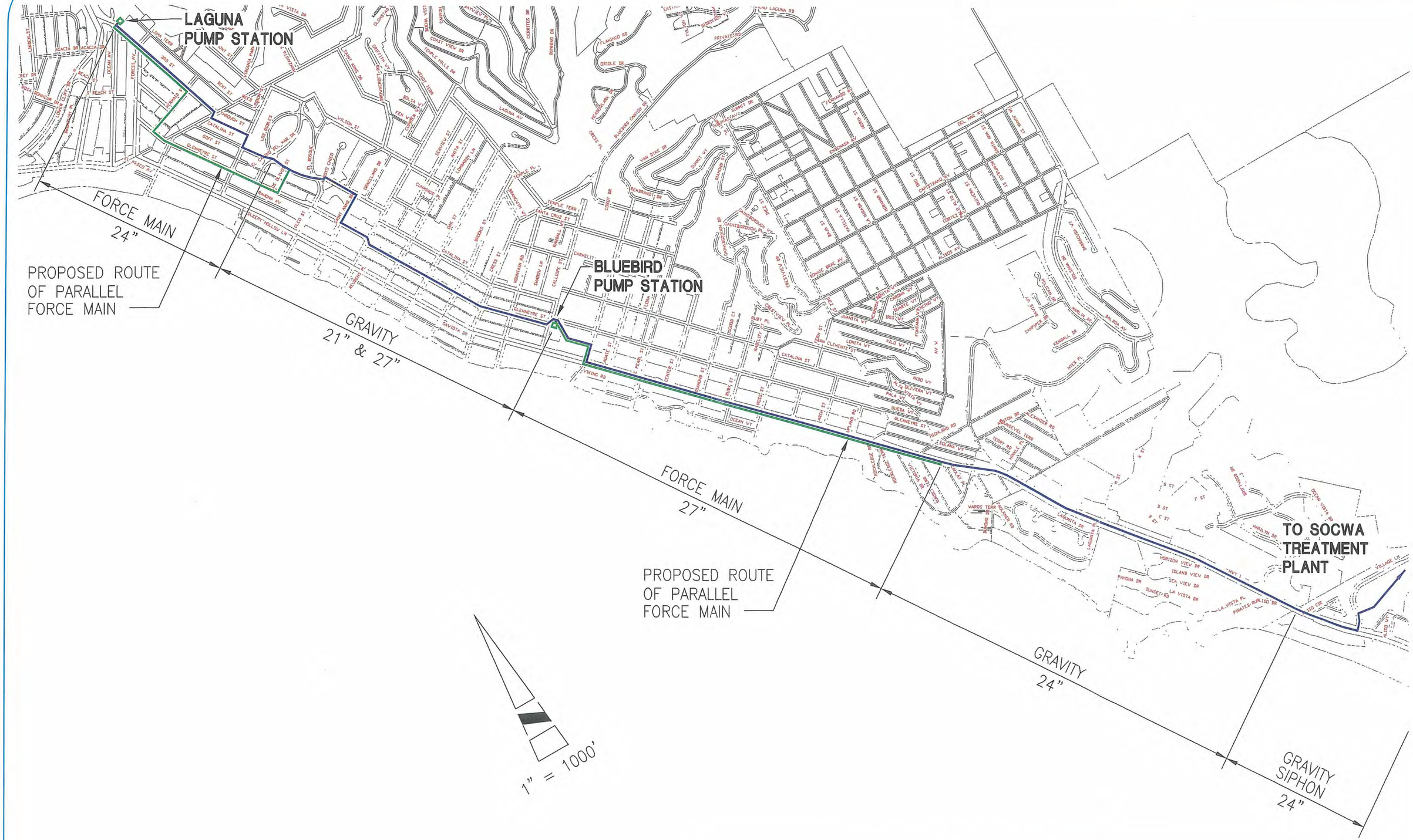
The two force mains are the portions of the NCI carrying the flow from the lift stations uphill to the two system high points (Catalina St./El Camino and Pacific Coast Highway/Nyes Place). They operate continuously under pressure created by the Laguna and Bluebird Lift Stations to force the raw sewage uphill. The blue hydraulic grade line on the profile of Figure 3-2 represents the pressure in feet of head required to convey the flow through the force main. The pressure varies from 0 at the high point where flow continues downstream by gravity to a high downstream of the pumps at the lift station.

Following is a description of the two force mains:

Laguna Lift Station Force Main

- Size = 24"
- Length = 2,770 feet
- Pipe material is asbestos cement pipe.
- Summer average daily flow = 1.37 mgd
  Winter average daily flow = 1.16 mgd

The profile of this force main begins relatively flat in Forest Avenue and Third Street and then proceeds up a very steep hill (about 31% grade) to an intermediate high point where air is released through an automatic air release valve. The pipeline profile follows the road profile down to an intermediate low point and proceeds to the high point where discharge is converted to gravity flow at a manhole.



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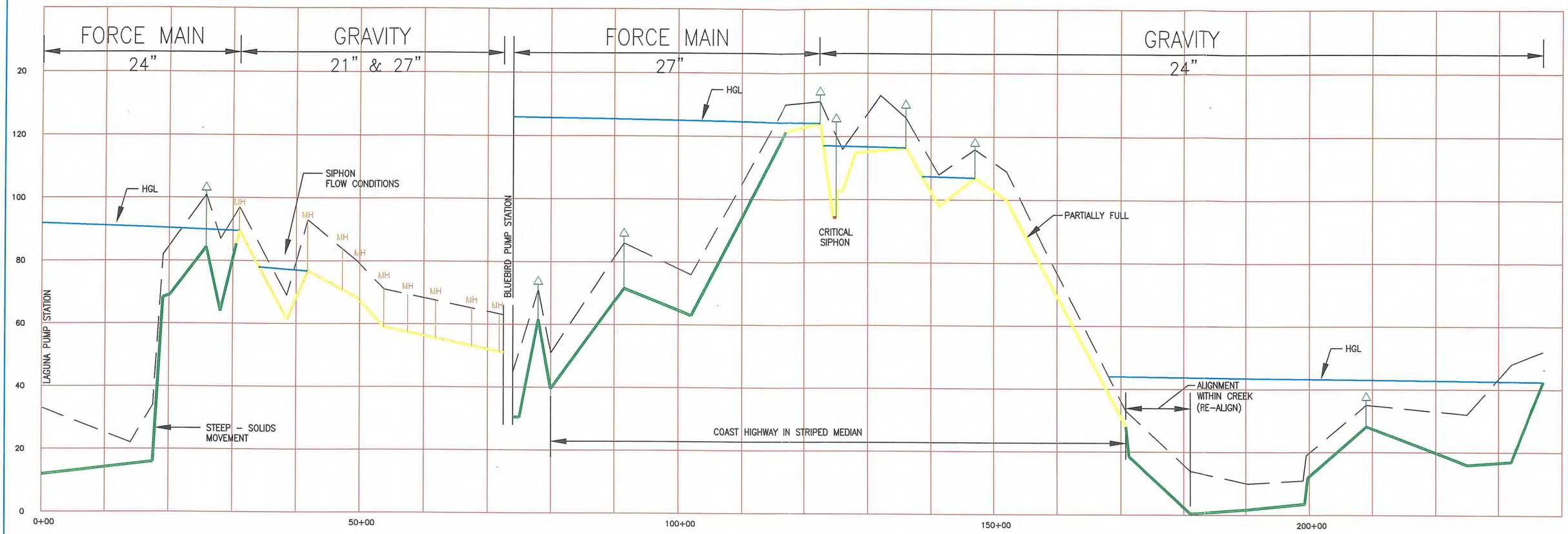
NORTH COAST INTERCEPTOR PLAN

FIGURE
3-1



LEGEND

- ASBESTOS CEMENT PIPE
- VITRIFIED CLAY PIPE
- FIBERGLASS REINFORCED PLASTIC PIPE
- MORTAR LINED STEEL PIPE
- AIR RELEASE VALVE LOCATION
- MH MANHOLE

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NORTH COAST INTERCEPTOR PROFILE

FIGURE
3-2

The significance of the intermediate high point is that normally this is a location where air that is entrained in the flow collects. This is because the flow velocity is not sufficient for it to continue downstream with the flow. Without the automatic air release valve the air will accumulate at the top of the pipe and form a large pocket that can significantly reduce the capacity of the pipeline. In addition, the top of the pipe barrel can be exposed to the corrosive sewer gases where air has collected to form a significant bubble.

Low points within the force main are locations where solids such as grit and small rocks can accumulate. These solids can move back and forth from the low point as the flow increases and decreases. This movement of the solids has been found to erode the bottom of the asbestos cement pipe. Although low points often cannot be eliminated in force mains, they do present a potential weak link for an ACP force main.

The pipe material changes from asbestos cement pipe to vitrified clay pipe in the pipeline approximately 112 feet before the manhole at the high point.

Maintaining an adequate flow velocity within the force main pipe is important in order to avoid the deposition of solids. Solids buildup could result in a blockage or substantial reduction of capacity. A minimum velocity of at least 3.5 feet per second (fps) at least once a day (at peak flow periods) should be sufficient to re-suspend those solids which may have settled out during the low flow period. The estimated average flow velocity in the Laguna Lift Station Force Main is calculated as follows:

Table 3.3-1
NCI 24" Force Main Flow Characteristics

Summer		Winter	
Flow (mgd)	Velocity (fps)	Flow (mgd)	Velocity (fps)
Ave. Daily = 1.37	0.68	Ave. Daily = 1.16	0.57
Peak = 2.19	1.08	Peak = 1.86	0.92

These flow velocities are very low compared to the above described desired cleansing velocity. As a result, we suspect that solids are accumulating at the lower points in this force main.

Bluebird Lift Station Force Main

- Size = 27"
- Length = 4,900 feet
- Pipe material is asbestos cement pipe and FRP pipe.
- Summer average daily flow = 2.28 mgd
  Winter average daily flow = 2.07 mgd

The profile of this force main proceeds uphill with two intermediate high points. At the final high point this force main deflects downward without access from a manhole. Automatic air release valves have been located at all three of these high points.

Again the pipe material changes within the force main, this time from asbestos cement pipe to fiberglass reinforced plastic pipe approximately 560 feet from the final high point of the force main.

The estimated average flow velocities for the Bluebird Lift Station Force Main are calculated as follows:

Table 3.3-2
NCI 24" Force Main Flow Characteristics

Summer		Winter	
Flow (mgd)	Velocity (fps)	Flow (mgd)	Velocity (fps)
Ave. Daily = 2.28	0.89	Ave. Daily = 2.07	0.80
Peak = 3.65	1.42	Peak = 3.31	1.29

Although these peak flow velocities are higher than the Laguna Lift Station, they are still significantly below the desired 3.5 fps cleansing velocity. We, similarly, suspect that solids could be accumulating at the intermediate low points.

3.3.3 Vitrified Clay Pipe (VCP) Gravity Portion

The portion of the NCI between the two lift stations flows by gravity under partially full conditions. This allows an air space above the flow surface for the offensive sewer atmosphere to travel with the flow and be contained within the piping system. It operates as a conventional gravity sewer with manholes spaced throughout to allow access for maintenance.

This gravity portion is composed of:

- Size = 27"
- Length = 3,060 feet
- Pipe material is vitrified clay pipe.

Siphon

This gravity portion of the NCI system contains one sewer siphon where the sewer follows a dip in the road along Catalina Street. Access manholes, spaced about 1,000 feet apart, are located at each end of the siphon to provide access for cleaning. Siphons within gravity systems are areas where solids can accumulate. They settle out during low flow periods and are not resuspended during the higher flow periods if the flow velocity is not sufficient.

The siphon consists of:

- Siphon size = 21"
- Siphon length = 975 feet
- Siphon pipe material is VCP (495 LF) and ACP (480 LF)

The flow velocity in the siphon is calculated as follows:

Table 3.3-3
NCI VCP Sewer Siphon Flow Characteristics

Summer		Winter	
Flow (mgd)	Velocity (fps)	Flow (mgd)	Velocity (fps)
Ave. Daily = 1.37	0.88	Ave. Daily = 1.16	0.75
Peak = 2.19	1.41	Peak = 1.86	1.20

Referring to the discussion above under the Laguna Lift Station Force Main regarding the desired cleansing velocity; the velocity range in this siphon does not reach a cleansing velocity throughout the day. City staff has indicated that this siphon has not been cleaned to date. We suspect solids are also accumulating in this siphon, but a total blockage has not yet occurred probably because of the relatively large pipe size of the siphon.

3.3.4 Fiberglass Reinforced Plastic (FRP) Pipe Gravity Portion

The first 4,140 feet of the gravity reach from the Bluebird Lift Station Force Main is comprised of fiberglass reinforced plastic pipe. It is located within the center median of the Pacific Coast Highway. The profile consists of two siphons followed by a relatively steep reach as it follows the profile of the Pacific Coast Highway.

Flow in this reach, except through the siphons, is open channel (the flow surface is below the top of the pipe) with a maximum depth to pipe diameter ratio (D/d) calculated at approximately 0.23. Throughout this reach, however, no access manholes have been provided for access to the pipeline for cleaning and maintenance operations. The open channel flow velocity is calculated to be at over 7 fps, which should keep these portions clean.

Automatic air release valves have been located at the outlet points of the force main and two siphons. These valves allow the release of air that accumulates at the intermediate high points where the flow transitions from a full pipe to open channel.

Siphons

The pipe will run full through the siphon throughout the day, resulting in lower velocities than the upstream and downstream open channel reaches. As a result, there us a concern that solids will settle out and accumulate as described above. Following are calculated mean flow velocities in these two siphons:

Table 3.3-4
NCI FRP Siphon Flow Characteristics

Summer		Winter	
Flow (mgd)	Velocity (fps)	Flow (mgd)	Velocity (fps)
Ave. Daily = 2.28	1.12	Ave. Daily = 2.07	1.02
Peak = 3.65	1.80	Peak = 3.31	1.63

The velocity in these two siphons also does not reach the desired cleansing velocity of 3.5 fps. Therefore, it can be expected that solids are accumulating within these two siphons.

Normally siphons are designed with the cleaning procedure in mind. Since the "balling" method is used predominately used to clean siphons of this size, it has been found that limiting the slope of the downstream (upslope) leg to 15% will enable the solids to be forced up the slope for removal. All the siphons, except for the siphon at Nyes Place, satisfy that criterion.

The siphon at Nyes Place crosses beneath the highway undercrossing and over a storm drain. This forces a local high point in the lower part of the siphon where an air release valve was installed. The pipe material at this siphon was changed to mortar lined and coated steel pipe, which is very subject to internal corrosion in sewer applications where there is a possibility that air can be trapped. City staff has indicated that some corrosion has already been observed and is concerned that it could be extensive.

3.3.5 Asbestos Cement Pipe Gravity Siphon

The alignment of the NCI leaves the Pacific Coast Highway at Country Club Drive and follows Aliso Creek Canyon in the creek and through the Aliso Creek Golf Course to the regional treatment plant. The pipe was initially constructed in 1980 to follow the creek through the Aliso Creek Golf Course property. In 1982 the pipe through the golf course was relocated out of the creek channel proper to the treatment plant. The pipe does remain within the bed of the creek through the "throat area" adjacent to the motel area as it enters the golf course. It is 24-inch asbestos cement pipe with a 12-inch thick concrete encasement to protect the pipe from potential floating and

scour through this throat area. The bed of the creek has eroded since the installation of the pipe to a level that has exposed the top of the encasement.

The entire reach from the Pacific Coast Highway to the treatment plant acts as a long 6,500-foot siphon. It's comprised of:

- Size = 24"
- Length = 7,280 feet
- Pipe material is asbestos cement pipe

The profile of the siphon has an intermediate high point with an automatic air release valve to release air that might accumulate at this point. The concern is the possibility of air pockets forming in the vicinity of the high point. This would result in the acid created from the sewer gases attacking the pipe interior as discussed above for the force main segments.

Being the same size as the two siphons in the FRP gravity portion described above, the mean velocity is calculated as follows:

Table 3.3-5
NCI ACP Siphon Flow Characteristics

Summer		Winter	
Flow (mgd)	Velocity (fps)	Flow (mgd)	Velocity (fps)
Ave. Daily = 2.28	1.12	Ave. Daily = 2.07	1.02
Peak = 3.65	1.80	Peak = 3.31	1.63

The lack of cleansing velocities could result in settling out of solids in this long siphon.

3.4 Assessment Analysis

3.4.1 Evaluation Criteria

The City has established a policy to eliminate sewage spills. With this in mind the assessment of the NCI considers the vulnerability of the NCI to several elements, which may be related or dependent upon each other. The assessment considers the vulnerability of the NCI to the following:

Condition – The system has been in operation for a little over 22 years. A sewer atmosphere is extremely corrosive. Therefore, the condition of the piping material is important to the continued long term operation of the system. The vulnerability of the piping materials to deterioration is examined. While examination of physical evidence of the pipe's condition is preferred, the ability to obtain these data is difficult for the NCI.

Operation – The ability to operate and maintain the system is reviewed. Keeping the system clean allows efficient operation, prolongs the life of the NCI, and maintains the required capacity in the piping system.

Reliability – The ability of the City staff to react to unusual or emergency situations affecting the NCI is reviewed. These situations may arise from natural causes such as earthquakes or storm events, from the natural aging of materials and equipment or from the operation of the system.

Some of the factors considered are:

- Blockage. This will reduce the capacity of the pipeline if a partial blockage and could result in a spill if the blockage is significant or total.
- Odor – The air within a sewer system can be extremely offensive. If allowed to escape to the atmosphere, it can be very unpleasant for the surrounding community.
- Deterioration. Deterioration of the piping material can result from both the internal conditions within the pipeline or from the external soil environment. Some pipe materials are more susceptive to corrosion than others.

- Damage. Damage can be from natural causes such as earthquakes or floods or from man made events such as from excavation in and around the pipe by contractors.

The assessment is a sequential step by step process built around a decision tree depending upon the nature of the data collected at each step. Below is an analysis of each of the pipeline segments of the NCI.

3.4.2 Analysis of Force Mains

Condition. The force mains consist of asbestos cement pipe (ACP). They have been in operation for twenty-two years. Historically, ACP has not proven to be a good long term pipe material for sewer force mains. It is attacked by the acid formed from the hydrogen sulfide gas that is released from sewage. While the force mains are designed to flow full, experience has shown that air does in fact accumulate in pockets within the force main piping. The two force mains on the NCI have intermediate high points in their profiles, which could be expected to capture air pockets. There may be others due to undocumented irregularities in the profile. These locations are prime areas for failure.

A major deterrent to obtaining physical data to assess the condition of the force mains is that there is no available facility to by-pass flow from the Lift Station around the force mains. This would allow the pipes to be drained for visual observation or obtain pipe wall specimens for analysis. Because of that, a temporary flow by-pass would need to be constructed, which could cost well over $0.5 million. There is inadequate wet well storage, which would allow adequate time for inspection. The pumps at the Lift Stations are off for a period of only 30 to 45 minutes at night when the flow is lowest. When it was required to replace valves at the Lift Stations a few years ago several pumper trucks and storage tanks were employed to provide enough time to shut the Lift Station down for the valve replacements.

In order to ascertain the condition of the force main pipe the following steps have been taken.

1. City staff was interviewed for a history of the maintenance, repair and emergency procedures that have taken place. To date no failures have occurred in either force main and as a result no repairs have been necessary. No cleaning has been

attempted to date because of lack of access. The staff does suspect that in the force main from the Laguna Lift Station that there may be pieces of concrete that have been passed by the pumps are trapped at the bottom of the steep hill on Third Street.

2. Sometimes it is possible to observe the interior top of the force main pipe from within a manhole. These locations are limited to those at the high point terminus of the force main because the flow transitions to open channel flow some distance into the force main pipe. However, the Laguna Lift Station Force Main changes pipe material from the ACP to VCP 200 feet before it reaches the manhole and, therefore, the ACP is not visible from this manhole. The Bluebird Lift Station Force Main does not have an access manhole at the high point transition and changes from ACP to FRP pipe several hundred feet before the high point. As a result, it was not possible to observe the pipe interior at the transition high points of either force main.

3. The possibility of observing the pipe interior from the small opening at the air release assemblies was explored. The proposal was to drain the pipe to the location of the air release valve, remove the air release valve assembly and insert a small closed circuit television (CCTV) camera. However, it was determined that this procedure could not be accomplished in the 30-45 minute time frame available. Also, the size of the CCTV camera that could fit through the 3-inch opening would not provide a sufficient picture in the large 24" pipe to visualize defects in the pipe wall. Therefore, this investigative procedure was not feasible for the two force mains in the NCI.

4. Obtaining physical data by collecting pipe coupons (3" to 4" circular sections of the pipe wall) using the hot tapping method was investigated. The coupon thickness could be measured and compared to the original installed wall thickness to ascertain if there has been a loss of wall thickness by corrosion. Four locations were identified for coupons where air might be expected to collect allowing the pipe wall to be corroded from acids formed in the sewer atmosphere. It must be recognized that the coupon represents the condition only at that location.

It may or may not be representative of the entire or a significant portion of the force mains.

Contractors specializing in the hot tapping procedure were contacted. They indicated that if proper materials (i.e. utilizing a full circumference tapping sleeve), equipment and procedures were employed, they believed that the pipe could be hot tapped successfully even in view of the age and application of the pipe. However, the City staff and the Wastewater Advisory Committee were reluctant to attempt the procedure in view of the critical nature of the two force mains and the fact that backup by-pass provisions are not available.

In lieu of proceeding further with the acquisition of pipe wall coupons, the City and the Wastewater Advisory Committee directed that research be carried out to identify the history of ACP in sewer force main applications and that a survey be made of surrounding local sewering agencies to obtain their history with the pipe materials that are contained in the NCI.

Eight sewering agencies in Southern California were surveyed to obtain their history of pipe materials in sewer force main applications. Appendix E contains the list of survey questions and a matrix summarizing the responses. Currently, the material of choice is either PVC pipe or lined ductile iron pipe to address the corrosive environment of a sewer force main. All the agencies no longer use ACP for new sewer force mains. A few small size (8-inch diameter) ACP force mains that were constructed some time ago are still in operation. All the agencies recognize the corrosion potential of ACP in sewer force main applications.

A field observation of some of the air release assemblies was made. The observation consisted of viewing the air release valves from the street surface. Table 4-1 is a summary of the observations. The detail field reports are included in the appendix.

Air release valve on PCH. Some odor detected.

Table 3.4-1
Field Observations of Air Release Assemblies - NCI

Location	Plan Station	Observations	Recommended Actions
Through St. at Legion St.	25+59	The circular manhole vault is in good condition. No odor detected.	No action.
Galen Dr. at Bluebird Canyon	77+80	The circular manhole vault is in good condition. No odor detected.	No action.
Pacific Coast Hwy. at Victoria Dr.	122+60	The circular manhole shaft is lined with PVC. Slight odor detected.	No action.
Pacific Coast Hwy. near Treasure Island	147+00	The circular manhole vault is in good condition. Odor detected.	No action.

The air release valves are maintained on a six month basis. The valves are removed and re-conditioned as necessary by City staff to insure they remain in good operating order.

The above recommendations are based on the observations of the condition of the air release valve assemblies and their function in the operation of the force main. A separate odor control study has been conducted and does recommend some modifications to the air release assembly on the Pacific Coast Highway near Treasure Island.

Reliability. A force main operates under pressure to force the wastewater uphill. A rupture or breakage in a force main usually results in a significant spill. Damage could result from natural causes, such as earthquakes, or from contractors excavating in the vicinity of the pipe and, inadvertently, hitting the pipe. ACP does not have significant impact resistance to construction equipment. Since there are no bypass opportunities for the two force mains on the NCI, the spill would multiply rapidly. Temporary measures to handle the flow would be costly. The cost to repair a failure on these force mains is exceptionally high because it is performed on an emergency basis and there is no convenient way to by-pass the flow. As an example, the cost recently to by-pass flow at the Laguna Lift Station to allow time

to install valves in the lift station was over $40,000 for one week. Consequently, as disclosed from the survey of other agencies some sewering agencies have adopted a standard to install a second redundant force main barrel to provide the flexibility to easily route flows to the second barrel should a problem be detected with the first barrel.

In view of (1) the uncertainty of the condition of the ACP material, (2) the questionable experience of ACP in similar sewer force main applications and (3) its exposure to significant spills should damage or failure occur, we recommend that consideration be given to constructing a second parallel force main barrel to each of the two NCI force mains. Aligning the parallel force main barrel in another street would enhance the reliability of the system since an event such as contractor damage or an earthquake would be less likely to occur in two different streets. A possible route for the parallel force main from the Laguna Lift Station is to follow from the lift station Third Street, Mermaid Street, Glenneyre Street and Los Olivos Street to the high point in Catalina Street. This route circumvents the steep portion of Third Street. From the Bluebird Lift Station a route following Glenneyre Street southerly would rise up a hill that is significantly higher than the high point of the existing force main in the Pacific Coast Highway. This would place significant additional head on the pumps and result in greater operating energy costs that over the long term. In addition, Glenneyre Street narrows as it continues southerly. As a result, it is recommended that the parallel force main follow the route of the existing force main in the Pacific Coast Highway.

The pipe should be sized to provide higher flow velocities that would enhance the operation of the system and reduce the possibilities of solids deposition within the force main piping at low points. In addition, detention time within the force main piping would be reduced, which would help in reducing odors releases. The opinion of probable construction costs reflect an 18-inch pipe for the new parallel force mains. A pipe material with a proven record in sewage force main applications should be used, such as PVC pipe or HDPE pipe. When the new barrel is placed in operation the condition of the existing pipe can be determined and rehabilitated as necessary in a non-emergency mode.

3.4.3 Analysis of VCP Gravity Portion

Significant corrosion and lining failure in manhole leading to Bluebird Lift Station

Condition. The VCP gravity portion is constructed as a conventional gravity sewer with manholes spaced to allow access for cleaning and maintenance activities. VCP has a history of longevity in gravity sewer systems. It is inert and resistant to corrosion from any acids that are formed in the sewer. A reach of this VCP gravity portion was CCTV inspected a few years ago and found to be in excellent condition according to City staff.

The manholes are the appurtenances that are subject to deterioration. A field inspection of each of the manholes was made and is included in the appendix. The manhole base and shaft sections are constructed of concrete and are unlined with the exception of the manhole at the terminus of the force main from the Laguna Lift Station, which is lined with PVC plastic liner plate. The PVC lined manhole is in very good condition, except for the grade rings, which need replacing. The other manholes exhibit varying degrees of deterioration from the acid formed within the sewer system. These manholes are recommended for rehabilitation by repairing and lining the base and shaft sections. The manhole leading into the Bluebird Lift Station was lined a few years ago with polyurethane. This lining has failed and the manhole shaft and base is badly deteriorated and should be replaced.

Table 4-2 on the next page is a summary of the observed condition of the manholes on the VCP gravity portion of the NCI.

Operation. This gravity segment operates as a conventional gravity sewer. Manholes are available for routine cleaning and other maintenance operations. This segment is a part of the City's regularly scheduled cleaning program. No improvements appear to be needed to enhance the operation of this portion of the NCI.

Reliability. Constructed of pipe that is inert to the corrosive effects of the sewer atmosphere with frequent manhole access makes this reach of the NCI reliable. Frequent manhole access makes routine cleaning and clearing blockages with conventional equipment relative easy. Should a reach need to be isolated for repair, bypassing flow can be accomplished by pumping around that particular manhole reach relatively economical.

Table 3.4-2
Field Observations of Manholes

Location	Plan Station	Observations	Recommended Actions
Catalina at El Camino	31+92	Channel in base and shaft lined with PVC – in good condition. Brick grade rings in poor condition.	Replace grade rings.
Catalina at St. Ann's Dr.	41+67	Deterioration of the shaft and base concrete.	Repair and line base and shaft.
Glenneyre at St. Ann's Dr.	45+52	Deterioration of the shaft and base concrete. Steps badly corroded.	Repair and line base and shaft. Remove steps.
Glenneyre at Thalia St.	48+69	Some concrete softening in the base and mid shaft section.	Repair and line base and shaft.
Glenneyre at Anita St.	53+14	Deterioration of the shaft and base concrete.	Repair and line base and shaft. Replace frame and cover.
Glenneyre at Oak St.	57+10	Slight concrete softening of base, but not apparently severe.	Monitor for increased deterioration.
Glenneyre at Cress St.	62+87	Slight concrete softening of base, but not apparently severe.	Monitor for increased deterioration.
Glenneyre at Mountain Rd.	67+37	Slight concrete softening of base, but not apparently severe.	Monitor for increased deterioration.
Glenneyre at Calliope St.	72+27	Polyurethane lining failed and significant deterioration of the shaft and base. Badly corroded steps.	Replace manhole completely with PVC lined manhole.

3.4.4 Analysis of Fiberglass Pipe Gravity Portion

Condition. Determination of the remaining useful service life of composites, such as fiberglass reinforced plastic pipe, is very difficult. Composites fail based upon strain and not stress. Composites creep under load and have higher creep rates at higher stress levels, but it

doesn't matter at what pressure creep is accumulated, it still accumulates. Micro cracks accumulate, and when the cracks join and become large cracks, failure is imminent. The problem with micro cracks is that they are too small to be seen, even under a microscope on polished coupons removed from pipe. Cracks are amazingly elusive. There is a theory, which presumes that if you can measure the micro cracks, and determine the percent relative to those when the pipe was new (another unknown) that the remaining life could be extrapolated. Design service life for FRP pipe is based upon regression analysis of strain testing in the laboratory. The original design data that are needed to determine remaining service life are also unavailable.

Research indicates that nobody has a really foolproof method of predicting failure of fiberglass pipe. If a sample was removed from the pipeline, it would probably fail in a quick-burst test at or very near the same pressure that it would be expected to fail if new. That is because composite pipes fail due to the accumulation of strain and creep, rather than stress. And there is no way to know what are the creep and strains accumulated to date.

There is a test of survival that could be used to determine the service life of FRP pipe. The test is based upon the slope of a regression curve at any load being constant. A value of 85% (to give a 15% margin) below that curve is selected and a line drawn parallel to the curve. Where it intercepts a set time is the pressure at which it is tested. The time to failure is then plotted to determine the remaining useful life at the pipeline's operating pressure. Such a test could be done on a sample of any FRP pipe. To be a valid test, the sample would have to be about 10 ft. long. The sample should be selected to represent the piece of pipe likely to have seen the highest load during its service life, and thus the highest accumulation of strain. However, the logistics of obtaining such a sample from the NCI and the cost involved is not warranted at this time.

More to the point: If it has not experienced a failure to date, it's unlikely to be structurally deficient.

The possibility of accessing the pipe interior from the cleanout tee in the Pacific Coast Highway just north of Country Club Drive (Station 166+55) was investigated. Flow at this point was found to be under a

slight pressure and, therefore, could not be used to introduce a CCTV camera for inspection of the pipe interior.

Location of siphon at PCH undercrossing at Nyes Place.

Siphon at Nyes Place. The condition of the steel pipe is a significant concern. Steel is noted for significant corrosion in sewage pipeline applications. Since staff has already identified corrosion that has taken place, this is an urgent situation. We have reviewed the site for location of an alternative alignment for a new replacement siphon. However, the public right of way in the vicinity of the highway undercrossing is heavily encumbered with other utilities and improvements, including the City's Nyes Place Lift Station. Therefore, the existing 24" steel pipe should be rehabilitated by insertion of a liner pipe that would carry both the internal pressure and external load for a completely deteriorated existing pipe condition. The design should also look at revising the profile at the bottom section to eliminate the intermediate high point that accumulates air.

Operation. Flow in this gravity portion of the NCI is for the most part partially full. However, there are no manholes to access the pipe for maintenance and cleaning operations. A particular concern is that at these two siphons there is no access manhole at the inlet and outlet points of the siphons. Should a blockage occur, access could not be obtained easily to clear the blockage. Since this portion of the NCI system is a closed pipeline, a full or partial blockage could be reflected back to the pumps, which may not be able to overcome the required pressure and result in a spill at the Lift Station. Conventional gravity sewer manholes should be installed at each end of both siphons and at standard spacing along the remaining partially full gravity segment.

Reliability. Assuming the pipe material is in good condition, the greatest concern for this gravity portion of the NCI is the lack of access to perform routine and emergency operations. The two siphons are of particular concern as locations where solids could be settling out of the flow and eventually cause a blockage. Without access manholes, removal of the blockage could require removal of a section of pipe. In addition, a blockage will not be detected until excessive discharge pressure is being seen at the lift station. That, however, may not provide sufficient lead time to avoid a significant problem or spill. With the addition of the access manholes described above and continued monitoring of the flow conditions, the reliability is substantially increased as discussed in the Section 3.4.3 above.

3.4.5 Analysis of Asbestos Cement Pipe Gravity Siphon Portion

There are several items of concern for this long siphon that are described as follows.

Condition. The profile of the siphon has an intermediate high point with an automatic air release valve to release air that might accumulate at this point. The concern is the possibility of air pockets forming in the vicinity of the high point and allowing the acid created from the sewer gases attacking the pipe interior as is discussed above for the force main segments.

Operation. A second concern is the ability of the flow to transport solids through the siphon. The velocity profile presented in Section 3.3.5 shows that cleansing velocities are not reached throughout the day. This probably results in the deposition of solids at the low points of the siphon profile. Due to the length of the siphon (6,500 feet) the siphon cannot be cleaned using the conventional balling or hydrojetting methods. However, the City should investigate cleaning the pipe by the pigging method. In pigging a sewer, a bullet shaped cylinder is inserted into the pipe upstream and is forced through the pipeline by the hydraulic head created upstream.

Reliability. The pipe was initially constructed in 1980 to follow the creek through the Aliso Creek Golf Course property. Figure 4-1 shows the current alignment of the pipeline with alternatives discussed below. In 1982 the pipe through the golf course was relocated out of some of the creek channel proper to the treatment plant. The pipe does remain within the bed of the creek through the "throat area" adjacent to the motel area as it enters the golf course. It is 24-inch asbestos cement pipe with a 12-inch thick concrete encasement to protect the pipe from potential floating and scour through this throat area. The bed of the creek has eroded since the installation of the pipe to a level that has exposed the top of the encasement. The concern is that the continued erosion of the creek bed could lead to the failure of the pipe by undercutting the ground supporting the pipe, or a significantly large storm event could damage the pipe through the impact of debris (large tree branches and boulders) on the pipe and undercutting the creek bed that supports the pipe. This could result in a pipe failure that would spill raw sewage to the creek and the ocean in a short period of time.

Aliso Creek is a natural watercourse that accepts drainage from a large watershed upstream. Water runs in the creek throughout the year, reaching peak flows during storm events. The creek has been slowly eroding the banks and bed since the installation of the NCI, and parts of the concrete encasement that protect the NCI are now exposed. Erosion of the creek could increase as continued upstream development increases the amount of impermeable surface area, forcing more storm runoff into the creek. The increased runoff could continue to scour the creeks bed until a stable channel slope and bed elevation is found that will accept the increased flow.

From a technical standpoint two options are available – either protect the pipe in place or relocate it out of the creek channel away from potential flood damage. Two alternatives were investigated to protect the exposed pipe in the riverbed. The first alternative is to protect the pipe by armoring the creek bed, placing large size riprap to slow down the flow and prevent riverbed erosion. The advantage of this alternative is that the force main does not need to be shut down during construction. Disadvantages to this alternative include the need for a permit from the Corps of Engineers for work in the creek bed, a flow analysis of the creek would be necessary to determine if the riprap would affect flow patterns, the possible increased liability the City would incur should damage to the golf course and adjacent property from flooding, and future pipeline maintenance issues, because the pipeline would be buried under riprap as well as encased in concrete. Previous attempts to line the bottom of the channel have lead to maintenance issues. This alternative is not recommended because of these possible effects on adjacent properties plus permitting issues and increased flow in the streambed as upstream development continues, and.

The second option is to relocate the portion of pipeline that is buried in the Aliso Creek bed through the "throat area". This relocation would have several advantages. The pipe could be sized to increase the minimum velocity to 2 feet per second so that solids would stay suspended and not build up at low points in the pipeline. The pipeline will be outside the creek, and therefore easier to inspect and maintain, and will not be vulnerable to erosion damage since it is not in the creek. Once the relocation is complete, the abandoned section of the NCI should be filled with a sand/cement slurry to seal the pipe and prevent water from leaking into the abandoned section and causing future problems for the nearby Aliso Creek Outfall.

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There are two possible alignments for a relocation of the NCI. This first alignment (Alignment 1) would move the pipeline outside of the creek bed and into the road next to the hotel. This alignment would have the advantage of being outside the creek, being the shortest relocation distance (approximately 1000 feet of pipe would be installed), and have a minimal effect on traffic. Issues that would need to be resolved include the location of existing utilities serving the hotel (water, sewer, telephone, electricity, and possibly gas), and the hotel and golf course property owners' permission and compensation that would be necessary to establish a new easement for the force main. A conceptual cost estimate for this alignment is approximately $350,000, including a 20 percent contingency for unknown factors. This estimate is based on the assumptions that the replacement pipe is the same diameter as the existing pipe, no costs were estimated for easement acquisition or utility relocation and assumes that the pipe has 4 ½ feet of cover. The design, however, should consider reducing the size to increase the flow velocity to at least 2 fps.

The second alignment (Alignment 2) would move the pipeline into Country Club Road, heading in roughly a northeast direction until the road terminates at the Country Club. The pipeline would then head in a southerly direction and join with the existing alignment at the intersection of the hotel, creek, and golf course property lines. This alignment is a longer route (approximately 1700 feet), and would have similar advantages and disadvantages to the first alignment, except that the anticipated traffic effects would be more significant (golf course traffic would be affected), utilities that feed both the golf course and the hotel could be affected, and more property would be required for the force main easement. Moving the pipeline away from the creek will help reduce the risks of spills into the creek, because the intervening distance will allow more time to discover and contain spills. A conceptual cost estimate for this alignment is approximately $530,000, including a 20 percent contingency for unknown factors. This estimate is based on the assumptions that the replacement pipe is the same diameter as the existing pipe, no costs were estimated for survey, easement acquisition, utility relocation, pipe abandonment, and assumes that the pipe has 4 ½ feet of cover. The design, however, should consider reducing the size to increase the flow velocity to at least 2 fps.

Maintaining the NCI pipe within the Aliso Creek streambed through the "throat area" greatly reduces the reliability of the facility by

There are two possible alignments for a relocation of the NCI. This first alignment (Alignment 1) would move the pipeline outside of the creek bed and into the road next to the hotel. This alignment would have the advantage of being outside the creek, being the shortest relocation distance (approximately 1000 feet of pipe would be installed), and have a minimal effect on traffic. Issues that would need to be resolved include the location of existing utilities serving the hotel (water, sewer, telephone, electricity, and possibly gas), and the hotel and golf course property owners' permission and compensation that would be necessary to establish a new easement for the force main. A conceptual cost estimate for this alignment is approximately $350,000, including a 20 percent contingency for unknown factors. This estimate is based on the assumptions that the replacement pipe is the same diameter as the existing pipe, no costs were estimated for easement acquisition or utility relocation and assumes that the pipe has 4 ½ feet of cover. The design, however, should consider reducing the size to increase the flow velocity to at least 2 fps.

The second alignment (Alignment 2) would move the pipeline into Country Club Road, heading in roughly a northeast direction until the road terminates at the Country Club. The pipeline would then head in a southerly direction and join with the existing alignment at the intersection of the hotel, creek, and golf course property lines. This alignment is a longer route (approximately 1700 feet), and would have similar advantages and disadvantages to the first alignment, except that the anticipated traffic effects would be more significant (golf course traffic would be affected), utilities that feed both the golf course and the hotel could be affected, and more property would be required for the force main easement. Moving the pipeline away from the creek will help reduce the risks of spills into the creek, because the intervening distance will allow more time to discover and contain spills. A conceptual cost estimate for this alignment is approximately $530,000, including a 20 percent contingency for unknown factors. This estimate is based on the assumptions that the replacement pipe is the same diameter as the existing pipe, no costs were estimated for survey, easement acquisition, utility relocation, pipe abandonment, and assumes that the pipe has 4 ½ feet of cover. The design, however, should consider reducing the size to increase the flow velocity to at least 2 fps.

Maintaining the NCI pipe within the Aliso Creek streambed through the "throat area" greatly reduces the reliability of the facility by

exposing it to damage with resultant sewage spill from storm events. The City should consider pursuing relocating this portion of the NCI out of the channel proper.

3.4.6 Recommendations

Following is a summary of the recommendations discussed above. An estimate of the costs of the improvements is included in Section 3.5.0.

ACP Force Mains

- Proceed with implementation of a second parallel force main barrel for the force mains leading from the two lift stations.
- Upon implementation of the second barrel, proceed with investigation of the condition of the existing force main piping and rehabilitation as necessary. For the purpose of estimating costs the assumption has been made that a high density polyethylene pipe liner will be inserted for the entire length of the pipe lines.

VCP Gravity Portion

- Proceed with lining, repair and replacement of the manholes as described above.

FRP Pipe Gravity Portion

- Rehabilitate the existing corroded steel pipe reach in the siphon at Nyes Place by insertion of a liner pipe.
- Construct conventional gravity sewer manholes at the two inlets and outlet siphon points and at standard spacing in the partially full reach.

ACP Gravity Siphon Portion

- Proceed with further investigation of relocating the portion of the NCI that is within Aliso Creek proper.

3.5 Cost Estimates

3.5.1 Estimated Costs

An opinion of probable construction cost summary for the recommended improvements is presented in Table 3.5-1 below.

Table 3.5-1
Opinion of Probable Construction and Project Cost

Project	Construction Cost	Project Cost [1]
Parallel Laguna Lift Station Force Main	$ 1,030,000	$ 1,340,000
Parallel Bluebird Lift Station Force Main	$ 1,710,000	$ 2,220,000
Rehabilitate Existing Laguna PS Force Main	$ 650,000	$ 850,000
Rehabilitate Existing Bluebird PS Force Main	$ 1,160,000	$ 1,510,000
Rehabilitate Manholes on VCP Gravity Portion	$ 100,000	$ 130,000
Rehabilitate Steel Pipe Siphon at Nyes Place	$ 300,000	$ 400,000
Construct Manholes on FRP Pipe Gravity Portion	$ 160,000	$ 210,000
Relocate NCI Pipe Out of Aliso Creek [2]	$ 420,000	$ 550,000
TOTAL	**$ 5,530,000**	**$ 7,210,000**

1. Project cost includes a 30% allowance for engineering, administration, inspection and legal.
2. Cost does not include right of way acquisition.

APPENDICES

APPENDIX A Lift Stations - Inspection Summaries

APPENDIX B Lift Stations – Photographs

APPENDIX C Lift Stations - Wastewater Hazardous Area Classifications

APPENDIX D North Coast Interceptor – Manhole Observations on VCP Gravity Segment

APPENDIX E North Coast Interceptor – Survey of Other Sewering Agencies

Appendix A

APPENDIX A
LIFT STATION
INSPECTION SUMMARIES

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 1 (Victoria Beach #1) **Date of Inspection:** Dec. 18, 2002

Mechanical Equipment:
Sewage pumps, Essco submersibles
Pump run times: P1 = 7,810 hours, P2 = 7,200 hours
Bubbler operation range: 25" / 10"
The interior surfaces have been coated, and the area outside grouted. Condensation/rust are major problems.

Electrical Equipment:
Emergency Power
240V 60A, 3W, 4P Generator Plug
Motors
Pump #1 - 240V, 3ph, 10 HP submersible
Pump #2 - 240V, 3ph, 10 HP submersible
Duplex Pump Control Panel -
1. Low Air Alarm Light
2. Level Display
3. High Water Alarm Light
4. Low Air Test Bottom
5. Manual Transfer Air Compressor
6. High Water Alarm Reset
7. Pump #1 C/B
8. Pump #2 C/B
9. ETM Pump #1
10. Blower C/B
11. Light C/B
12. ETM Pump #2
13. Pump #1 Run Light
14.Pump #1 HOA
15. Pump #1 Reset Pushbuttom
16. Light Test
17. Pump #1 Run Light
18.Pump #1 HOA
19. Pump #1 Reset Pushbuttom

Instrumentation Control Panel (ICP)
1. Pump #1 Run
2. Pump #1 Fail
3. Pump #2 Run

4. Pump #2 Fail
5. High Wet Well
6. High Dry Well
7. Bubbler Fail
8. Power Fail

Exhaust Fan

120V, 1/4 hp

Electrical Equipment Observations:

1. Provide new NEMA 3R box
2. Legs of Bubbler control panel are corroded

Code Violations

1. NFPA-820 (Provide gas detection system for wet well)
2. NEC-501 (Provide explosion proof seals for conduits entering or leaving control panel)

Structural:

Structural plans not available.
The wet well interior surfaces were covered by significant amounts of loose materials and staining that limited the surface visibility.
Wet well concrete corrosion is moderate to severe.
The dry portions of the structure were observed to be in good condition.

Recommendations:

1. Schedule pump/motor replacement.
2. Install pumping tee in force main.
3. Apply protective lining to wet well interior to resist further concrete corrosion.
4. Replace corroded electrical equipment
5. Provide explosion proof seals for conduits entering or leaving control panel
6. Provide gas detection system for wet well
7. Install generator unit.

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 2 (Victoria Beach #2) **Date of Inspection:** Dec. 24, 2002

Mechanical Equipment:
Sewage pumps, Essco 4x4x10x3-15, Design Point 250 gpm @ 100', 1750 rpm
Serial No. 94460-2, Imp. Dia. = 9.94"
Pump run times: P1 = 4,750 hours, P2 = 4,620 hours
Bubbler operation range: 25" / 10"
There is an intermediate level between the street and pump room, contains vent fans and panels.

Electrical Equipment:
Emergency Power
240V, 100A, 3W, 4P Generator Plug
Motors
Pump #1 - 240V, 3 Phase, 10HP, Submersible type, Class 1, Groups C & D.
Pump #2 - 240V, 3 Phase, 10HP, Submersible type, Class 1, Groups C & D.
Duplex Pump Control Panel -
1. Low Air Alarm Light
2. Level Display
3. High Water Alarm Light
4. Alarm Silence Pushbuttom
5. Manual Transfer Air Compressor
6. High Water Alarm Reset
7. Pump #1 C/B
8. Pump #2 C/B
9. ETM Pump #1
10. Blower1 C/B
11. Blower 2 C/B
12. Light C/B
13. ETM Pump #2
14. Pump #1 Run Light
15.Pump #2 HOA
16. Pump #2 Reset Pushbuttom
17. Light Test
18. Pump #1 Run Light
19.Pump #1 HOA
20. Pump #1 Reset Pushbuttom
21. Bell
22. Alarm Light on top of enclosure

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 2 (Victoria Beach #2) **Date of Inspection:** Dec. 24, 2002

Mechanical Equipment:
Sewage pumps, Essco 4x4x10x3-15, Design Point 250 gpm @ 100', 1750 rpm
Serial No. 94460-2, Imp. Dia. = 9.94"
Pump run times: P1 = 4,750 hours, P2 = 4,620 hours
Bubbler operation range: 25" / 10"
There is an intermediate level between the street and pump room, contains vent fans and panels.

Electrical Equipment:
Emergency Power
240V, 100A, 3W, 4P Generator Plug
Motors
Pump #1 - 240V, 3 Phase, 10HP, Submersible type, Class 1, Groups C & D.
Pump #2 - 240V, 3 Phase, 10HP, Submersible type, Class 1, Groups C & D.
Duplex Pump Control Panel -
1. Low Air Alarm Light
2. Level Display
3. High Water Alarm Light
4. Alarm Silence Pushbuttom
5. Manual Transfer Air Compressor
6. High Water Alarm Reset
7. Pump #1 C/B
8. Pump #2 C/B
9. ETM Pump #1
10. Blower1 C/B
11. Blower 2 C/B
12. Light C/B
13. ETM Pump #2
14. Pump #1 Run Light
15.Pump #2 HOA
16. Pump #2 Reset Pushbuttom
17. Light Test
18. Pump #1 Run Light
19.Pump #1 HOA
20. Pump #1 Reset Pushbuttom
21. Bell
22. Alarm Light on top of enclosure

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 3 (Rockledge) **Date of Inspection:** Dec. 18, 2002

Mechanical Equipment:
One sewage pump, submersible, in the wet well.
Pump run time: 2,140 hours
Bubbler operation range: 24" / 8"
The wet well is a fiberglass tank, easy to overflow. There is no valve in the suction line.
The station does not have a pump tee.

Electrical Equipment:
Emergency Power
240V, 60A, 3W, 4P Generator Plug
Motor
Pump #1 - 240V, 3 Phase, 10HP, Submersible type, Class 1, Groups C & D.
Duplex Pump Control Panel -
1. Low Air Alarm Light
2. Level Display
3. High Water Alarm Light
4. Low Air Test Bottom
5. Manual Transfer Air Compressor
6. High Water Alarm Reset
7. Pump #1 C/B
8. ETM Pump #1
9. Blower C/B
10. Light C/B
11. Pump #1 Run Light
12. Pump #1 HOA
13. Pump #1 Reset Pushbuttom
14. Light Test

Instrumentation Control Panel (ICP)

1. Pump #1 Run
2. Pump #1 Fail
3. High Wet Well
4. High Dry Well
5. Bubbler Fail
6. Power Fail

Dry Well Sump Pump

120V, Plug in type, operates with float

Electrical Equipment Observations

1. A supply fan may need to be installed, the fresh air may help with the corrosion problem in the dry well
2. Power pullbox is very corroded and needs to be replaced.
3. Conduit Body for bubbler tube is missing.
4. Feeder from utility meter to Bubbler Control Panel starts with aluminum wire and terminates with copper wire in Bubbler Control Panel, the splice box can not be located.
5. ICP is corroded

Code Violations

1. NFPA-820 (Provide gas detection system for wet well)
2. The wet well is a fiber glass enclosure in the dry well, the dry well should be class 1, Division 1 rated.
3. NEC-501 (Provide explosion proof seals for conduits entering or leaving control panel)

Structural:

Structural plans not available.
Reinforced concrete structure with FRP wet well.
The dry portions of the structure were observed to be in good condition.

Recommendations:

1. Schedule pump/motor replacement.
2. Replace corroded electrical equipment
3. Provide explosion proof seals for conduits entering or leaving control panel
4. Provide gas detection system for wet well
5. Change lights and receptacles to Class I, Division 1 since the wet well is located in the dry well.

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 4 (Millers) **Date of Inspection:** Dec. 18, 2002

Mechanical Equipment:
Two sewage pumps, submersible, in the wet well.
Pump run times: P1 = 410 hours, P2 = 390 hours
Bubbler operation range: 36" / 12"
Equipment removal very difficult, steep and narrow access.
There is a problem with condensation inside the station; metal sufaces are wet. Much rusting was noted.
The station is subject to flooding.
The force main has a history of breaks.

Electrical Equipment:
Emergency Power
240V, 100A, 3W, 4P Generator Plug
Motors
Pump #1 - 240V, 3 Phase, 5 HP, Submersible type, Class 1, Groups C & D.
Pump #2 -240xV, 3 Phase, 5 HP, Submersible type, Class 1, Groups C & D.
Duplex Pump Control Panel -
1. Low Air Alarm Light
2. Level Display
3. High Water Alarm Light
4. Low Air Test Bottom
5. Manual Transfer Air Compressor
6. High Water Alarm Rest
7. Pump #1 C/B
8. Pump #2 C/B
9. ETM Pump #1
10. Blower C/B
11. Light C/B
12. ETM Pump #2
13. Pump #1 Run Light
14. Pump #1 HOA
15. Pump #1 Reset Pushbuttom
16. Light Test
17. Pump #2 Run Light
18. Pump #2 HOA
19. Pump #2 Reset Pushbuttom

Instrumentation Control Panel (ICP)

1. Pump #1 Run
2. Pump #1 Fail
3. Pump #2 Run
4. Pump #2 Fail
5. High Wet Well
6. High Dry Well
7. Bubbler Fail
8. Power Fail

Exhaust Fan

120V, 1/4 HP, operates 24 hours

Electrical Equipment Observations

1. A supply fan may need to be installed, the fresh air may help with the corrosion problem in the dry well
2. Power pullbox is very corroded and needs to be replaced.
3. Conduit is corroded and needs to be replaced.

Code Violations

1. NFPA-820 (Provide gas detection system for wet well)
2. NEC-501 (Provide explosion proof seals for conduits entering or leaving control panel)

Structural:

Structural plans not available.
Reinforced concrete structure.
Access to wet well is restricted by undersized opening.
The wet well interior surfaces were covered by significant amounts of loose materials and staining that limited the surface visibility.
Wet well concrete corrosion is minor to moderate. Steel cover plate is severely corroded.
The dry portions of the structure were observed to be in good condition.

Recommendations:

1. Schedule pump/motor replacement.
2. Relocate electrical panel outdoors.
3. Replace corroded electrical equipment
4. Provide explosion proof seals for conduits entering or leaving the control panel
5. Provide gas detection system for wet well
6. Change lights and receptacles to Class I, Division 2 In the dry well.
7. Relocate control panel outside

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 5 (Pearl Street) **Date of Inspection:** Dec. 18, 2002

Mechanical Equipment:

Sewage pumps, Essco 4x4x10x3, Design Point 150 gpm @ 52', 1750 rpm
Serial No. 94080-2, Imp. Dia. = 7.63"
Pump run times: P1 = 8,490 hours, P2 = 7,880 hours
Bubbler operation range: 30" / 12"
Overflow will be from the wet well to the dry pit.
There is a circulation fan in the dry pit for heat dissipation.
The station does not have a pump tee.

Electrical Equipment:

Emergency Power

240V, 60A, 3W, 4P Generator Plug

Motors

Pump #1 - 240V, 3 Phase, 7.5HP, Submersible type, Class 1, Groups C & D.
Pump #2 - 240V, 3 Phase, 7.5HP, Submersible type, Class 1, Groups C & D.

Duplex Pump Control Panel -

1. Low Air Alarm Light
2. Level Display
3. High Water Alarm Light
4. Low Air Test Bottom
5. Manual Transfer Air Compressor
6. High Water Alarm Rest
7. Pump #1 C/B
8. Pump #2 C/B
9. ETM Pump #1
10. Blower C/B
11. Light C/B
12. ETM Pump #2
13. Pump #1 Run Light
14. Pump #1 HOA
15. Pump #1 Reset Pushbuttom
16. Light Test
17. Pump #2 Run Light
18. Pump #2 HOA
19. Pump #2 Reset Pushbuttom

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 5 (Pearl Street) **Date of Inspection:** Dec. 18, 2002

Mechanical Equipment:

Sewage pumps, Essco 4x4x10x3, Design Point 150 gpm @ 52', 1750 rpm
Serial No. 94080-2, Imp. Dia. = 7.63"
Pump run times: P1 = 8,490 hours, P2 = 7,880 hours
Bubbler operation range: 30" / 12"
Overflow will be from the wet well to the dry pit.
There is a circulation fan in the dry pit for heat dissipation.
The station does not have a pump tee.

Electrical Equipment:

Emergency Power

240V, 60A, 3W, 4P Generator Plug

Motors

Pump #1 - 240V, 3 Phase, 7.5HP, Submersible type, Class 1, Groups C & D.
Pump #2 - 240V, 3 Phase, 7.5HP, Submersible type, Class 1, Groups C & D.

Duplex Pump Control Panel -

1. Low Air Alarm Light
2. Level Display
3. High Water Alarm Light
4. Low Air Test Bottom
5. Manual Transfer Air Compressor
6. High Water Alarm Rest
7. Pump #1 C/B
8. Pump #2 C/B
9. ETM Pump #1
10. Blower C/B
11. Light C/B
12. ETM Pump #2
13. Pump #1 Run Light
14. Pump #1 HOA
15. Pump #1 Reset Pushbuttom
16. Light Test
17. Pump #2 Run Light
18. Pump #2 HOA
19. Pump #2 Reset Pushbuttom

Instrumentation Control Panel (ICP)

1. Pump #1 Run
2. Pump #1 Fail
3. Pump #2 Run
4. Pump #2 Fail
5. High Wet Well
6. High Dry Well
7. Bubbler Fail
8. Power Fail

Dry Well Sump Pump

120V, Plug in type, operates with float

Exhaust Fan

120V, 1/4 HP, operates 24 hours

Electrical Equipment Observations

1. A supply fan may need to be installed, the fresh air may help with the corrosion problem in the dry well
2. Telephone cabinet is corroded and needs to be replaced.

Code Violations

1. NFPA-820 (Provide gas detection system for wet well)
2. The wet well may overflow into the drywell, the dry well should be Class I, Division 1
3. NEC-501 (Provide explosion proof seals for conduits entering or leaving control panel)

Structural:

Plans dated August 1957.
Concrete masonry building above-grade, reinforced concrete below-grade.
Some eave concrete is falling off.
The wet well interior surfaces were covered by significant amounts of loose materials and staining that limited the surface visibility.
Wet well interior concrete is severely corroded.
Except as noted, dry portions of the structure were observed to be in good condition.

Recommendations:

1. Install pumping tee in force main.
2. Apply protective lining to wet well interior to resist further concrete corrosion.
3. Replace corroded electrical equipment
4. Provide explosion proof seals for conduits entering or leavinf control panel
5. Provide gas detection system for wet well
6. Change lights,receptacles and exhaust fans to Class I, Division 1 In the dry well.
7. Install generator unit.

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 6 (Bluebird Canyon) **Date of Inspection:** Dec. 18, 2002

Mechanical Equipment:

Sewage pumps, Essco C4x4x12x3, Design Point 400 gpm @ 49', 1150 rpm
Serial No. 96086-2, Imp. Dia. = 10-3/4"
Pump run times: P1 = 5,330 hours, P2 = 6,570 hours
Bubbler operation range: 32" / 10"

A second wet well was added for increased storage. A mixer is used to keep solids moving.
There is a circulation fan in the dry pit for heat dissipation.
The station does not have a pump tee.
During the summer, minor storm drain flows are diverted to the wet well, to keep water from the beach; during the winter, the flows run to the beach.

Electrical Equipment:

Emergency Power

240V, 60KW Generator with transfer switch

Motors

Pump #1 - 240V, 3 Phase, 10HP, Submersible type, Class 1, Groups C & D.
Pump #2 -240V, 3 Phase, 10HP, Submersible type, Class 1, Groups C & D.

Duplex Pump Control Panel -

1. Low Air Alarm Light
2. Level Display
3. High Water Alarm Light
4. Low Air Test Bottom
5. Manual Transfer Air Compressor
6. High Water Alarm Rest
7. Pump #1 C/B
8. Pump #2 C/B
9. ETM Pump #1
10. Blower C/B
11. Light C/B
12. ETM Pump #2
13. Pump #1 Run Light
14. Pump #1 HOA
15. Pump #1 Reset Pushbuttom
16. Light Test
17. Pump #1 Run Light

18.Pump #1 HOA
19. Pump #1 Reset Pushbuttom

Instrumentation Control Panel (ICP)

1. Pump #1 Run
2. Pump #1 Fail
3. Pump #2 Run
4. Pump #2 Fail
5. High Wet Well
6. High Dry Well
7. Bubbler Fail
8. Power Fail

Dry Well Sump Pump

120V, Plug in type, operates with float

Exhaust Fan

120V, 1/4 HP, operates 24 hours (exhaust fan is corroded and should be replaced)

Electrical Equipment Observations

1. A supply fan may need to be installed for heat dissipation in the dry well.
   dry well
2. Generator is very corroded.

Code Violations

1. NFPA 820 (Provide gas detection system for wet well)
2. NEC-501 (Provide explosion proof seals for conduits entering or leaving control panel)

Structural:

Plans dated August 1957.
The wet well interior surfaces were covered by significant amounts of loose materials and staining that limited the surface visibility.
Wet well interior concrete corrosion is moderate to severe.
Standby generator building is concrete masonry and in good condition.

Recommendations:

1. Install pumping tee in force main.
2. Apply protective lining to wet well interior to resist further concrete corrosion.
3. Replace corroded electrical equipment
4. Provide gas detection system for wet well
5. Change lights and receptacles to Class I, Division 2 In the dry well.
6. Add exhaust fan and supply fan to the dry well

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 7 (Brooks Street) **Date of Inspection:** Dec. 18, 2002

Mechanical Equipment:

Sewage pumps, Essco

Pump run times: P1 = 1,690 hours, P2 = 1,760 hours

Bubbler operation range: 24" / 14"

The wet well is a small fiberglass storage tank.

The station does not have a pump tee.

Electrical Equipment:

Normal Power

Meter Pedestal needs to be replaced, currently it is very corroded.

Emergency Power

240V, 100A, 3W, 4P Generator Plug

Generator transfer panel is very corroded and should be replaced.

Motors

Pump #1 - 240V, 3 Phase, 2 HP, Submersible type, Class 1, Groups C & D.

Pump #2 - 240V, 3 Phase, 2 HP, Submersible type, Class 1, Groups C & D.

Duplex Pump Control Panel -

1. Low Air Alarm Light
2. Level Display
3. High Water Alarm Light
4. Low Air Alarm Reset Buttom
5. Manual Transfer Air Compressor
6. High Water Alarm Rest
7. Pump #1 C/B
8. Main C/B
9. Pump #2 C/B
10. ETM Pump #1
11. ETM Pump #2
12. Pump #1 Run Light
13. Seal Fail Test
14. Pump #2 Run Light
15. Pump #1 HOA
16. Light Test
17. Pump #2 HOA
18. Pump #1 Seal Fail
19. Pump #1 Overload Reset Buttom
20. Duplex Seal fail

21. Pump #2 Seal Fail
22. Pump #1 Overload Reset Buttom

Instrumentation Control Panel (ICP)

1. Pump #1 Run
2. Pump #1 Fail
3. Pump #2 Run
4. Pump #2 Fail
5. High Wet Well
6. High Dry Well
7. Bubbler Fail
8. Power Fail

Dry Well Sump Pump

120V, Plug in type, operates with float

Exhaust Fan

120V, 1/4 HP, operates 24 hours.

Electrical Equipment Observations

1. Receptacle is very corroded and should be replaced.
2. Light switch is very corroded and should be replaced.
3. Conduit is corroded and needs to be replaced.

Code Violations

1. NFPA 820 (Provide gas detection system for wet well)
2. The Wet well is a small fiberglass storage tank, it is inside the Dry Well.
3. The Dry Well should be rated Class I, Division 1.
4. NEC-501 (Provide explosion proof seals for conduits entering or leaving control panel)

Structural:

Structural plans not available.
Reinforced concrete structure with adjacent concrete masonry walls.
Dry portions of the structure were observed to be in good condition. Ceiling concrete has some cracking near door.
FRP wet well was observed to be in good condition.

Recommendations:

1. Schedule pump/motor replacement.
2. Install pumping tee in force main.
3. Replace corroded electrical equipment
4. Provide explosion proof seals for conduits entering or leaving control panel
5. Provide gas detection system for wet well
6. Change lights, receptacles and exhaust fans to Class I, Division 1 in the dry well.
7. Relocate generator transfer switch and power panels outside
8. Install generator unit.
9. Relocate control panel outside

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 8 (Anita Street) **Date of Inspection:** Dec. 18, 2002

Mechanical Equipment:

Sewage pumps, Essco C4x4x10x3, Design Point 400 gpm @ 78', 1750 rpm
Serial No. 98434-1, Imp. Dia. = 9.5"
Pump run times: P1 = 3,130 hours, P2 = 2,810 hours
Bubbler operation range: 36" / 14"
The wet well will overflow into the pump room, then to the beach.
The station does not have a pump tee.
Engine-generator unit: Kohler generator, 60 kw. Model 70R2202, Serial No. 271771

Electrical Equipment:

Normal Power

Meter Pedestal may need to be replaced, currently it is very corroded.

Emergency Power

120/240V, 60KW, 3W, 4P Generator with Automatic Transfer Switch

Generator Plug Panel is very corroded and should be replaced.

Motors

Pump #1 - 240V, 3 Phase, 20HP, Submersible type, Class 1, Groups C & D.
Pump #2 - 240V, 3 Phase, 20HP, Submersible type, Class 1, Groups C & D.

Duplex Pump Control Panel -

1. Low Air Alarm Light
2. Alarm Bell
3. High Water Alarm Light
4. Manual Transfer Air Compressor
5. Level Display
6. High Water Alarm Rest
7. Pump #1 C/B
8. Main C/B
9. Pump #2 C/B
10. ETM Pump #1
11. ETM Pump #2
12. Pump #1 Run Light
13. Seal Fail Test
14. Pump #2 Run Light
15. Pump #1 HOA
16. Light Test
17. Pump #2 HOA

18. Pump #1 Seal Fail
19. Pump #1 Overload Reset Buttom

Instrumentation Control Panel (ICP)

1. Pump #1 Run
2. Pump #1 Fail
3. Pump #2 Run
4. Pump #2 Fail
5. High Wet Well
6. High Dry Well
7. Bubbler Fail
8. Power Fail

Dry Well Sump Pump

120V, Plug in type, operates with float

Exhaust Fan

120V, 1/4 HP, operates 24 hours.

Electrical Equipment Observations

1. Receptacle is very corroded and should be replaced.
2. Light switch is very corroded and should be replaced.
3. Conduit is corroded and needs to be replaced.

Code Violations

1. NFPA 820 (Provide gas detection system for wet well)
2. Wet well overflows to dry well, the electrical for the Dry Well should be Class I, Division 1.
3. NEC-501 (Provide explosion proof seals for conduits entering or leaving control panel)

Structural:

Plans dated August 1957.
Reinforced concrete structure. Concrete is cracked and falling from portions of the building eave.
Floor beam reinforcing is exposed and corroded in one location.
The wet well interior surfaces were covered by significant amounts of loose materials and staining that limited the surface visibility.
Wet well concrete is severely corroded.

Recommendations:

1. Apply protective lining to wet well interior to further resist concrete corrosion.
2. Remove loose concrete at first floor beam- patch with concrete
3. Replace corroded electrical equipment
4. Provide explosion proof seals for conduits entering or leaving control panel
5. Provide gas detection system for wet well
6. Change lights, receptacles and exhaust fans to Class I, Division 1 in the dry well.
7. Add exhaust fan and supply fan to the dry well

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 9 (Cleo Lane) **Date of Inspection:** Dec. 18, 2002

Mechanical Equipment:

Sewage pumps, Essco submersibles in wet pit

Pump run times: P1 = 2,320 hours, P2 = 2,300 hours

Bubbler operation range: 7' / 2'

The engine-generator unit is located in separate building.

Generator is Kohler, 60 kw.

In an emergency, the wet well will overflow to the old wet well, then to the pump room (now empty).

Electrical Equipment:

Emergency Power

240V, 60KW Generator with Automatic Transfer Switch

NEMA 3R enclosure is corroded

Motors

Pump #1 - 240V, 3 Phase, 20HP, Submersible type, Class 1, Groups C & D.

Pump #2 - 240V, 3 Phase, 20HP, Submersible type, Class 1, Groups C & D.

Duplex Pump Control Panel -

1. Low Air Alarm Light
2. Level Display
3. High Water Alarm Light
4. Low Air Test Bottom
5. Manual Transfer Air Compressor
6. High Water Alarm Rest
7. Pump #1 C/B
8. Pump #2 C/B
9. ETM Pump #1
10. Blower C/B
11. Light C/B
12. ETM Pump #2
13. Pump #1 Run Light
14. Pump #1 HOA
15. Pump #1 Reset Pushbuttom
16. Light Test
17. Pump #1 Run Light
18. Pump #1 HOA
19. Pump #1 Reset Pushbuttom

Instrumentation Control Panel (ICP)

1. Pump #1 Run
2. Pump #1 Fail
3. Pump #2 Run
4. Pump #2 Fail
5. High Wet Well
6. High Dry Well
7. Bubbler Fail
8. Power Fail

Dry Well Sump Pump

120V, Plug in type, operates with float

Exhaust Fan

120V, 1/4 HP, operates 24 hours

Electrical Equipment Observations

1. A supply fan may need to be installed, the fresh air may help with the corrosion problem in the dry well
2. Power pullbox is very corroded and needs to be replaced (generator room).
3. Conduit is corroded and needs to be replaced.
4. Exhaust fan is corroded.

Code Violations

1. NFPA-820 (Provide gas detection system for wet well)
2. NEC-501 (Provide explosion proof seals for conduits entering or leaving control panel)

Structural:

Structural plans not available.
Structural dwgs. of the new wet well are not available.
Circular concrete wet well was observed to be in good condition.
The abandoned wet well interior surfaces were covered by significant amounts of loose materials and staining that limited the surface visibility.
Abandoned wet well (not in service) concrete is severely corroded.
The dry portions of the structure were observed to be in good condition.

Recommendations:

1. Schedule pump/motor replacement.
2. Install pumping tee in force main.
3. Replace corroded electrical equipment
4. Provide explosion proof seals for conduits entering or leaving the control panel
5. Provide gas detection system for wet well
6. Change lights and receptacles to Class I, Division 2 In the dry well.

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 10 (Animal Shelter) **Date of Inspection:** Dec. 24, 2002

Mechanical Equipment:
One sewage pump, submersible, in the wet well.
Pump run time: 4,650 hours (sum of both ETM's.
The control panel is for two pumps; wiring is occasionally switched)
Bubbler operation range: 55" / 10"
The station does not have a pump tee.

Electrical Equipment:
Emergency Power
None
Motor
Pump #1 - 230V, 1 Phase, 1.5HP, Submersible type, Class 1, Groups C & D.

Pump Control Panel
1. Low Air Alarm Light
2. Level Display
3. High Water Alarm Light
4. Low Air Test Bottom
5. Manual Transfer Air Compressor
6. High Water Alarm Rest
7. Pump #1 C/B
8. Pump #2 C/B
9. ETM Pump #1
12. ETM Pump #2
13. Pump #1 Run Light
14.Pump #1 HOA
15. Pump #1 Reset Pushbuttom
16. Light Test
17. Pump #1 Run Light
18.Pump #1 HOA
19. Pump #1 Reset Pushbuttom
20. Alarm Silence
21. Main CB
22. Seal Fail Test
23. Seal Fail Pump 1
24. Seal Fail Pump 2

25. Alarm Bell
26. Alarm Light

Note: Controls are for two pumps but only one pump is in service

Structural:
Reinforced concrete circular manhole structure.
No corrosion of the epoxy-coated wet well concrete was observed.
The coating appears to be sound and serving well to protect the concrete from further corrosion.

Recommendations:
1. Schedule pump/motor replacement.
2. Install pumping tee in force main.

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 11 (Main Beach) **Date of Inspection:** Dec. 24, 2002

Mechanical Equipment:

Sewage pumps, Essco 4x4x14x3, Design Point 600 gpm @ 70', 1750 rpm
Serial No. 96316-1, Imp. Dia. = 13.25"
Pump run times: P1 = 3,980 hours, P2 = 3,900 hours, P3 = 4,060 hours
Bubbler operation range: 30" / 12"

Plug valves (Homestead) in the discharge lines for two pumps do not close tightly.
The station has an engine-generator; Cummins Cal Pacific (unknown capacity).
The station has a pump tee.
Three bioxide storage tanks are located in the lift station.

Electrical Equipment:

Emergency Power

240V, 60A, 3W, 4P Generator, in generator room

Motors

Pump #1 - 240V, 3 Phase, 20HP, Submersible type, Class 1, Groups C & D.
Pump #2 - 240V, 3 Phase, 20HP, Submersible type, Class 1, Groups C & D.
Pump #3 - 240V, 3 Phase, 20HP, Submersible type, Class 1, Groups C & D.

Pump Control Panel -

1. Power On Light
1. Low Air Alarm Light
2. Level Display
3. High Water Alarm Light
5. High Wet Well
6. Low Air Test Bottom
7. Bubbler System Reset
8. Bubbler System Fail
9. Manual Transfer Air Compressor
10. High Water Alarm Rest
11. Pump #1 C/B
12. Pump #2 C/B
13. Pump #3 C/B
14. ETM Pump #1
15. ETM Pump #2
16. ETM Pump #3
17. Pump #1 Run Light
18. Pump #1 HOA

19. Pump #1 Reset Pushbuttom
20. Pump #2 Run Light
21. Pump #2 HOA
22. Pump #2 Reset Pushbuttom
23. Pump #3 Run Light
24. Pump #3 HOA
25. Pump #3 Reset Pushbuttom
26. Light Test
27. Duplex Receptacle

Instrumentation Control Panel (ICP)

1. Pump #1 Run
2. Pump #1 Fail
3. Pump #2 Run
4. Pump #2 Fail
5. Pump #3 Run
6. Pump #3 Fail
5. High Wet Well
6. High Dry Well
7. Bubbler Fail
8. Power Fail
9. Generator Fail

Note: ICP has space for three more signals

Dry Well Sump Pump

1. Sump Pump-120V, Plug in type, operates with float

Exhaust Fan

120V, 1/4 HP, operates 24 hours

Electrical Equipment Observations

1. A supply fan may need to be installed to help with heat dissipation.
2. Sump pump receptacle is very corroded and should be replaced.
3. Exhaust fan is very corroded and should be replaced.
4. Generator has surface rust.
5. Generator Room floor is wet

Code Violations

1. NFPA-820 (Provide gas detection system for wet well)
2. NEC-501 (Provide explosion proof seals for conduits entering or leaving control panel)

19. Pump #1 Reset Pushbuttom
20. Pump #2 Run Light
21.Pump #2 HOA
22. Pump #2 Reset Pushbuttom
23. Pump #3 Run Light
24. Pump #3 HOA
25. Pump #3 Reset Pushbuttom
26. Light Test
27. Duplex Receptacle

Instrumentation Control Panel (ICP)

1. Pump #1 Run
2. Pump #1 Fail
3. Pump #2 Run
4. Pump #2 Fail
5. Pump #3 Run
6. Pump #3 Fail
5. High Wet Well
6. High Dry Well
7. Bubbler Fail
8. Power Fail
9. Generator Fail

Note: ICP has space for three more signals

Dry Well Sump Pump

1. Sump Pump-120V, Plug in type, operates with float

Exhaust Fan

120V, 1/4 HP, operates 24 hours

Electrical Equipment Observations

1. A supply fan may need to be installed to help with heat dissipation.
2. Sump pump receptacle is very corroded and should be replaced.
3. Exhaust fan is very corroded and should be replaced.
4. Generator has surface rust.
5. Generator Room floor is wet

Code Violations

1. NFPA-820 (Provide gas detection system for wet well)
2. NEC-501 (Provide explosion proof seals for conduits entering or leaving control panel)

Structural:
Plans for modifications are dated November 1957. No structural dwgs. of original construction are available.
Reinforced concrete structure. The south wall above the high water level is of 3" cement plaster construction. A sealed access door to the wet well is built into the wall.
The dry portions of the structure were observed to be in good condition.
The wet well interior surfaces were covered by significant amounts of loose materials and staining that limited the surface visibility.
Wet well concrete corrosion is moderate to severe. Some reinforcing is exposed.
Wet well ladders are severely corroded.

Recommendation:
1. Replace corroded electrical equipment
2. Provide explosion proof seals for conduits entering or leaving control panel
3. Provide gas detection system for wet well
4. Change lights, receptacles and exhaust fans to Class I, Division 1 in the dry well.
5. Add exhaust fan and supply fan to the dry well
6. Move generator and transfer switch outside of dry well
7. Relocated two power panels outside of drywell.

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 13 (Fisherman's Cove) **Date of Inspection:** Dec. 18, 2002

Mechanical Equipment:

Sewage pumps, Essco 4x4x12x3, Design Point 400 gpm @ 62', 1750 rpm
Serial No. 98435-1, Imp. Dia. = 11.63"
Pump run times: P1 = 440 hours, P2 = 450 hours
Bubbler operation range: 38" / 14"

During the summer, minor storm drain flows are diverted to the wet well, to keep water from the beach; during the winter, the flows run to the beach.

The station does not have a pump tee.

Electrical Equipment:

Emergency Power

208V, 60A, 3W, 4P Generator Plug
Generator plug enclosure is corroded and should eventually be replaced.

Motors

Pump #1 - 208V, 3 Phase, 10HP, Submersible type, Class 1, Groups C & D.
Pump #2 - 208V, 3 Phase, 10HP, Submersible type, Class 1, Groups C & D.

Duplex Pump Control Panel -

1. Low Air Alarm Light
2. Level Display
3. High Water Alarm Light
4. Low Air Test Bottom
5. Manual Transfer Air Compressor
6. High Water Alarm Rest
7. Pump #1 C/B
8. Pump #2 C/B
9. ETM Pump #1
10. Blower C/B
11. Light C/B
12. ETM Pump #2
13. Pump #1 Run Light
14. Pump #1 HOA
15. Pump #1 Reset Pushbuttom
16. Light Test
17. Pump #1 Run Light
18. Pump #1 HOA
19. Pump #1 Reset Pushbuttom

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 13 (Fisherman's Cove) **Date of Inspection:** Dec. 18, 2002

Mechanical Equipment:

Sewage pumps, Essco 4x4x12x3, Design Point 400 gpm @ 62', 1750 rpm
Serial No. 98435-1, Imp. Dia. = 11.63"
Pump run times: P1 = 440 hours, P2 = 450 hours
Bubbler operation range: 38" / 14"

During the summer, minor storm drain flows are diverted to the wet well, to keep water from the beach; during the winter, the flows run to the beach.

The station does not have a pump tee.

Electrical Equipment:

Emergency Power

208V, 60A, 3W, 4P Generator Plug
Generator plug enclosure is corroded and should eventually be replaced.

Motors

Pump #1 - 208V, 3 Phase, 10HP, Submersible type, Class 1, Groups C & D.
Pump #2 - 208V, 3 Phase, 10HP, Submersible type, Class 1, Groups C & D.

Duplex Pump Control Panel -

1. Low Air Alarm Light
2. Level Display
3. High Water Alarm Light
4. Low Air Test Bottom
5. Manual Transfer Air Compressor
6. High Water Alarm Rest
7. Pump #1 C/B
8. Pump #2 C/B
9. ETM Pump #1
10. Blower C/B
11. Light C/B
12. ETM Pump #2
13. Pump #1 Run Light
14. Pump #1 HOA
15. Pump #1 Reset Pushbuttom
16. Light Test
17. Pump #1 Run Light
18. Pump #1 HOA
19. Pump #1 Reset Pushbuttom

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 12 (Heisler Park) **Date of Inspection:** Dec. 18, 2002

Mechanical Equipment:
One sewage pump, submersible, in the wet well.
Pump run time: 1,480 hours
Bubbler operation range: 38" / 8"
The station does not have a pump tee.

Electrical Equipment:
Emergency Power
None
Motor
Pump #1 - 220V, 1 Phase, 1.5 HP, Submersible type, Class 1, Groups C & D.
Pump Control Panel
1. Pump Run Light
2. Pump HOA
3. Light Test
4. Seal Fail
5. Bubbler System Fail
6. Duplex Receptacle
7. Reset
8. Power On
9. Level
10. Pump C/B
11. ETM

Code Violations
NFPA-820 (Provide gas detection system for wet well)

Structural:
Reinforced concrete circular manhole structure.
Wet well concrete exhibits minor to moderate corrosion.

Recommendations:
Abandon lift station.

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 13 (Fisherman's Cove) **Date of Inspection:** Dec. 18, 2002

Mechanical Equipment:

Sewage pumps, Essco 4x4x12x3, Design Point 400 gpm @ 62', 1750 rpm
Serial No. 98435-1, Imp. Dia. = 11.63"
Pump run times: P1 = 440 hours, P2 = 450 hours
Bubbler operation range: 38" / 14"

During the summer, minor storm drain flows are diverted to the wet well, to keep water from the beach; during the winter, the flows run to the beach.

The station does not have a pump tee.

Electrical Equipment:

Emergency Power

208V, 60A, 3W, 4P Generator Plug
Generator plug enclosure is corroded and should eventually be replaced.

Motors

Pump #1 - 208V, 3 Phase, 10HP, Submersible type, Class 1, Groups C & D.
Pump #2 - 208V, 3 Phase, 10HP, Submersible type, Class 1, Groups C & D.

Duplex Pump Control Panel -

1. Low Air Alarm Light
2. Level Display
3. High Water Alarm Light
4. Low Air Test Bottom
5. Manual Transfer Air Compressor
6. High Water Alarm Rest
7. Pump #1 C/B
8. Pump #2 C/B
9. ETM Pump #1
10. Blower C/B
11. Light C/B
12. ETM Pump #2
13. Pump #1 Run Light
14. Pump #1 HOA
15. Pump #1 Reset Pushbuttom
16. Light Test
17. Pump #1 Run Light
18. Pump #1 HOA
19. Pump #1 Reset Pushbuttom

Instrumentation Control Panel (ICP)

1. Pump #1 Run
2. Pump #1 Fail
3. Pump #2 Run
4. Pump #2 Fail
5. High Wet Well
6. High Dry Well
7. Bubbler Fail
8. Power Fail

Dry Well Sump Pump

120V, Plug in type, operates with float
Sump pump receptacle is very corroded and should be replaced

Exhaust Fan

120V, 1/4 HP, operates 24 hours

Electrical Equipment Observations:

1. Exhaust fan is very corroded and should be replaced.
2. Transfer switch is corroded.

Code Violations

1. NFPA-820 (Provide gas detection system for wet well)
2. NEC-501 (Provide explosion proof seals for conduits entering or leaving control panel)

Structural:

Structural plans not available.
Reinforced concrete structure
The dry portions of the structure were observed to be in good condition.
Ladder access to pump level does not conform to OSHA requirements.
The wet well interior surfaces were covered by significant amounts of loose materials and staining that limited the surface visibility.
Wet well concrete corrosion is severe. Some reinforcing is exposed.

Recommendations:

1. Install pumping tee in force main.
2. Apply protective lining to wet well interior to further resist concrete corrosion.
3. Replace exist. dry well ladder rungs with SST ladder
3. Replace corroded electrical equipment
4. Provide explosion proof seals for conduits entering or leaving the control panel
5. Provide gas detection system for wet well
6. Change lights and receptacles to Class I, Division 2 In the dry well.
7. Relocate control panels outside

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 14 (Fairview) **Date of Inspection:** Dec. 18, 2002

Mechanical Equipment:
Sewage pumps, Essco
Pump run times: P1 = 7,190 hours, P2 = 5,730 hours
Bubbler operation range: 50" / 20"
The vent fan is inoperable.
The wet well will overflow to an adjacent storm drain.
The station does not have a pump tee.

Electrical Equipment:
Emergency Power
208V, 60A, 3W, 4P Generator Plug
Motors
Pump #1 - 208V, 3 Phase, 15HP, Submersible type, Class 1, Groups C & D.
Pump #2 - 208V, 3 Phase, 15HP, Submersible type, Class 1, Groups C & D.
Duplex Pump Control Panel -
1. Low Air Alarm Light
2. Level Display
3. High Water Alarm Light
4. Low Air Alarm Reset Buttom
5. Manual Transfer Air Compressor
6. High Water Alarm Rest
7. Pump #1 C/B
8. Main C/B
9. Pump #2 C/B
10. ETM Pump #1
11. ETM Pump #2
12. Pump #1 Run Light
13. Seal Fail Test
14. Pump #2 Run Light
15. Pump #1 HOA
16. Light Test
17. Pump #2 HOA
18. Pump #1 Seal Fail
19. Pump #1 Overload Reset Buttom
20. Duplex Seal fail
21. Pump #2 Seal Fail

22. Pump #1 Overload Reset Buttom

Instrumentation Control Panel (ICP)

1. Pump #1 Run
2. Pump #1 Fail
3. Pump #2 Run
4. Pump #2 Fail
5. High Wet Well
6. High Dry Well
7. Bubbler Fail
8. Power Fail

Dry Well Sump Pump

120V, Plug in type, operates with float

Exhaust Fan

120V, 1/4 HP, operates 24 hours.

Electrical Equipment Observations:

1. Exhaust fan is very corroded and should be replaced.

Code Violations

1. California Title 8 (Electrical equipment needs to be de-energized in case of of a concurrent gas detection and in case of exhaust fan failure)
2. Provide explosion-proof seals for all conduit entering or leaving the Dry Well
3. NEC-501 (Provide explosion proof seals for conduits entering or leaving control panel)

Structural:

Structural plans not available.
Reinforced concrete structure above-grade has minor concrete spalling.
Access ladder to pump level does not comply to OSHA standards.
The wet well interior surfaces were covered by significant amounts of loose materials and staining that limited the surface visibility.
Wet well concrete corrosion is moderate to severe.
Wet well ladder is corroded away.

Recommendations:

Station is scheduled for extensive rehabilitation, including pump/motor replacements, new wet well, and electrical equipment replacement.

22. Pump #1 Overload Reset Buttom

Instrumentation Control Panel (ICP)

1. Pump #1 Run
2. Pump #1 Fail
3. Pump #2 Run
4. Pump #2 Fail
5. High Wet Well
6. High Dry Well
7. Bubbler Fail
8. Power Fail

Dry Well Sump Pump

120V, Plug in type, operates with float

Exhaust Fan

120V, 1/4 HP, operates 24 hours.

Electrical Equipment Observations:

1. Exhaust fan is very corroded and should be replaced.

Code Violations

1. California Title 8 (Electrical equipment needs to be de-energized in case of of a concurrent gas detection and in case of exhaust fan failure)
2. Provide explosion-proof seals for all conduit entering or leaving the Dry Well
3. NEC-501 (Provide explosion proof seals for conduits entering or leaving control panel)

Structural:

Structural plans not available.
Reinforced concrete structure above-grade has minor concrete spalling.
Access ladder to pump level does not comply to OSHA standards.
The wet well interior surfaces were covered by significant amounts of loose materials and staining that limited the surface visibility.
Wet well concrete corrosion is moderate to severe.
Wet well ladder is corroded away.

Recommendations:

Station is scheduled for extensive rehabilitation, including pump/motor replacements, new wet well, and electrical equipment replacement.

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 15 (Crescent Bay) **Date of Inspection:** Dec. 18, 2002

Mechanical Equipment:

Sewage pumps, Essco C4x4x12x3 SDP, Design Point 325 gpm @ 108', 1750 rpm
Serial No. 20409-1 and -2, Imp. Dia. = 10-3/4"
Pump run times: P1 = 575 hours, P2 = 566 hours
Bubbler operation range: 50" / 20"

The wet well will overflow through the access hatch into the room at grade, then to the dry pit.
The station has a pump tee.

Electrical Equipment:

Emergency Power

120/208V, 60KW, 3 Phase Generator with Automatic Transfer Switch

Motors

Pump #1 - 208V, 3 Phase, 20HP, Submersible type, Class 1, Groups C & D.
Pump #2 - 208V, 3 Phase, 20HP, Submersible type, Class 1, Groups C & D.

Duplex Pump Control Panel -

1. Low Air Alarm Light
2. Level Display
3. High Water Alarm Light
4. Low Air Test Bottom
5. Manual Transfer Air Compressor
6. High Water Alarm Rest
7. Pump #1 C/B
8. Pump #2 C/B
9. ETM Pump #1
10. Blower C/B
11. Light C/B
12. ETM Pump #2
13. Pump #1 Run Light
14. Pump #1 HOA
15. Pump #1 Reset Pushbuttom
16. Light Test
17. Pump #1 Run Light
18. Pump #1 HOA
19. Pump #1 Reset Pushbuttom

Instrumentation Control Panel (ICP)

1. Pump #1 Run
2. Pump #1 Fail

3. Pump #2 Run
4. Pump #2 Fail
5. High Wet Well
6. High Dry Well
7. Bubbler Fail
8. Power Fail

Dry Well Sump Pump

120V, Plug in type, operates with float

Exhaust Fan

120V, 1/4 HP, operates 24 hours

Electrical Equipment Observations:

1. Exhaust fan is very corroded and should be replaced.
2. Generator leaks oil

Code Violations

1. NFPA-820 (Provide gas detection system for wet well)
2. NEC-501 (Provide explosion proof seals for conduits entering or leaving control panel)

Structural:

Structural plans not available.
Reinforced concrete structure, part of public restroom. The structure is scheduled for rehabilitation, including a new roof.
The entry door is short, with a 20" step down to the ground floor.
Standby generator building is of concrete masonry construction and was observed to be in good condition.
Ladder to pump level does not comply with OSHA requirements.
Masonry pilasters on the ocean side of the building are cracked, split. and falling off at some locations.
Damage was caused by saltwater intrusion and corrosion of reinforcing. The resulting steel corrosion products caused expansion which led to cracking and spalling of the masonry.
The wet well interior surfaces were covered by significant amounts of loose materials and staining that limited the surface visibility.
Wet well corrosion is moderate to severe.
Wet well ladder is corroded away.

Recommendations:

1. Apply protective lining to wet well interior to further resist concrete corrosion.
2. Replace exist. dry well ladder rungs with SST ladder
3. Replace exist. wet well ladder with SST ladder
4. Repair masonry pilasters
5. Replace corroded electrical equipment
6. Provide explosion proof seals for conduits entering or leaving the control panel
7. Provide gas detection system for wet well
8. Change lights and receptacles to Class I, Division 2 In the dry well.

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 16 (McKnight) **Date of Inspection:** Dec. 18, 2002

Mechanical Equipment:
Two sewage pumps, station does not have a wet well.
Pump run times: P1 = 495 hours, P2 = 829 hours
Bubbler operation range: 45" / 30" (connection is to the suction piping)
The station does not have a pump tee.

Electrical Equipment:
Normal Power Meter Cabinet
Needs to be replaced due to severe corrosion
Emergency Power
240V, 60A, 3 Phase Generator Plug
Motors
Pump #1 - 220V, 1 Phase, 3HP, Submersible type, Class 1, Groups C & D.
Pump #2 - 220V, 1 Phase, 3HP, Submersible type, Class 1, Groups C & D.
Duplex Pump Control Panel -
1. Low Air Alarm Light
2. Level Display
3. High Water Alarm Light
4. Low Air Test Bottom
5. Manual Transfer Air Compressor
6. High Water Alarm Rest
7. Pump #1 C/B
8. Pump #2 C/B
9. ETM Pump #1
10. Blower C/B
11. Light C/B
12. ETM Pump #2
13. Pump #1 Run Light
14. Pump #1 HOA
15. Pump #1 Reset Pushbuttom
16. Light Test
17. Pump #1 Run Light
18. Pump #1 HOA
19. Pump #1 Reset Pushbuttom

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 16 (McKnight) **Date of Inspection:** Dec. 18, 2002

Mechanical Equipment:
Two sewage pumps, station does not have a wet well.
Pump run times: P1 = 495 hours, P2 = 829 hours
Bubbler operation range: 45" / 30" (connection is to the suction piping)
The station does not have a pump tee.

Electrical Equipment:
Normal Power Meter Cabinet
Needs to be replaced due to severe corrosion
Emergency Power
240V, 60A, 3 Phase Generator Plug
Motors
Pump #1 - 220V, 1 Phase, 3HP, Submersible type, Class 1, Groups C & D.
Pump #2 - 220V, 1 Phase, 3HP, Submersible type, Class 1, Groups C & D.
Duplex Pump Control Panel -
1. Low Air Alarm Light
2. Level Display
3. High Water Alarm Light
4. Low Air Test Bottom
5. Manual Transfer Air Compressor
6. High Water Alarm Rest
7. Pump #1 C/B
8. Pump #2 C/B
9. ETM Pump #1
10. Blower C/B
11. Light C/B
12. ETM Pump #2
13. Pump #1 Run Light
14.Pump #1 HOA
15. Pump #1 Reset Pushbuttom
16. Light Test
17. Pump #1 Run Light
18.Pump #1 HOA
19. Pump #1 Reset Pushbuttom

Instrumentation Control Panel (ICP)

1. Pump #1 Run
2. Pump #1 Fail
3. Pump #2 Run
4. Pump #2 Fail
5. High Wet Well
6. High Dry Well
7. Bubbler Fail
8. Power Fail

Electrical Equipment Observations:

Electrical panel is subject to flooding.

Code Violations

1. NFPA-820 (Provide gas detection system for wet well)
2. Provide 3-foot clearance in front of Duplex Pump Control Panel
3. NEC-501 (Provide explosion proof seals for conduits entering or leaving control panel)

Structural:

Structural plans not available.
Reinforced concrete structure
Stairwell walls are not sufficiently high to prevent stormwater from flooding the stairwell and pump station areas.
No wet well in this pumping station.

Recommendations:

1. Schedule pump/motor replacement.
2. Install pumping tee in force main.
3. Raise top of stairwell walls to resist flooding
4. Relocate meter power panel and provide NEMA 4 enclosure (to keep panel from flooding)
5. Provide gas detection system for wet well
6. Change lights and receptacles to Class I, Division 2 in the dry well.
7. Relocate control panel ouside

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 17 (Irvine Cove) **Date of Inspection:** Dec. 18, 2002

Mechanical Equipment:

Sewage pumps, Essco 4x12-20-4VDP, Design Point 200 gpm @ 118', 1750 rpm
Serial No. 8740-1 and 8517-1, Imp. Dia. = 11-1/4"
Pump run times: P1 = 3,876 hours, P2 = 3,508 hours
Bubbler operation range: 45" / 28"

The wet well has a hole in the top which will allow overflow to the beach.
The station has a pump tee.

Electrical Equipment:

Emergency Power

460V, 60A, 3W, 4P Generator transfer switch

Motors

Pump #1 - 460V, 3 Phase, 20HP, Submersible type, Class 1, Groups C & D.
Pump #2 - 460V, 3 Phase, 20HP, Submersible type, Class 1, Groups C & D.

Duplex Pump Control Panel -

1. Low Air Alarm Light
2. Level Display
3. High Water Alarm Light
4. Low Air Test Bottom
5. Manual Transfer Air Compressor
6. High Water Alarm Rest
7. Pump #1 C/B
8. Pump #2 C/B
9. ETM Pump #1
10. Blower C/B
11. Light C/B
12. ETM Pump #2
13. Pump #1 Run Light
14. Pump #1 HOA
15. Pump #1 Reset Pushbuttom
16. Light Test
17. Pump #1 Run Light
18. Pump #1 HOA
19. Pump #1 Reset Pushbuttom

Instrumentation Control Panel (ICP)

1. Pump #1 Run
2. Pump #1 Fail
3. Pump #2 Run
4. Pump #2 Fail
5. High Wet Well
6. High Dry Well
7. Bubbler Fail
8. Power Fail

Dry Well Sump Pump

120V, Plug in type, operates with float

Exhaust Fan

120V, 1/4 HP, operates 24 hours (exhaust fan is corroded and should be replaced)

Code Violations

1. NFPA-820 (Provide gas detection system for wet well)
2. NEC-501 (Provide explosion proof seals for conduits entering or leaving control panel)

Structural:

Reinforced concrete structure with wood roof. Plans dated March 1957.
4' x 10' x 8' deep wet well plus square shaft access
The wet well interior surfaces were covered by significant amounts of loose materials and staining that limited the surface visibility.
Wet well corrosion is moderate to severe.
The dry portions of the structure were observed to be in good condition.

Recommendations:

1. Schedule pump/motor replacement.
2. Apply protective lining to wet well interior to further resist concrete corrosion.
3. Replace exist. wet well ladder with SST ladder
4. Replace corroded electrical equipment
5. Provide explosion proof seals for conduits entering or leaving the control panel
6. Provide gas detection system for wet well
7. Change lights and receptacles to Class I, Division 2 In the dry well.
8. Relocate power panel and generator transfer switch outside
9. Relocate control panel outside

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 18 (Santa Cruz) **Date of Inspection:** Dec. 18, 2002

Mechanical Equipment:
One sewage pump, submersible.
Pump run time: 1,380 hours
Bubbler operation range: 30" / 10"
The wet well is kept low; higher level could cause back-up in a house with a low floor level.
Due to a constrained opening, the pump/motor unit cannot be removed from the wet well without dissembly.
The station has a pump tee.

Electrical Equipment:
Emergency Power
240V, 60A, 3 Phase
Motors
Pump #1 - 240V, 3 Phase, 5 HP, Submersible type, Class 1, Groups C & D.

Pump Control Panel -
1. Low Air Alarm Light
2. Alarm Bell
3. High Water Alarm Light
4. Air Pumps 1 & 2
5. Level
6. Alarm Silence
7. Alarm Reset
8. Main C/B
9. Alarm Reset
10. Pump Run
11. ETM
12. Seal FailMain C/B

Instrumentation Control Panel (ICP)

1. Pump #1 Run
2. Pump #1 Fail
3. Pump #2 Run
4. Pump #2 Fail
5. High Wet Well
6. High Dry Well
7. Bubbler Fail
8. Power Fail

Code Violations

1. NFPA-820 (Provide gas detection system for wet well)

Structural:

Structural plans not available.
Reinforced concrete manhole structure
Wet well concrete has minor corrosion.

Recommendations:

Abandon the station.

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 19 (Bernard Court) **Date of Inspection:** Dec. 24, 2002

Mechanical Equipment:
Sewage pumps, Essco 4x12DP, Design Point 100 gpm @ 72', 1750 rpm
Serial No. 87207-1, Imp. Dia. = 8.81"
Pump run times: P1 = 1,050 hours, P2 = 950 hours
Bubbler operation range: 30" / 5"
The station does not have a pump tee.

Electrical Equipment:
Emergency Power
460V, 60A, 3W, 4P Generator Plug
Motors
Pump #1 - 460V, 3 Phase, 7 1/2HP, Submersible type, Class 1, Groups C & D.
Pump #2 - 460V, 3 Phase, 7 1/2HP, Submersible type, Class 1, Groups C & D.
Duplex Pump Control Panel -
1. Low Air Alarm Light
2. Level Display
3. High Water Alarm Light
4. Alarm Silence Pushbuttom
5. Manual Transfer Air Compressor
6. Wet well high level alarm silence reset
7. Pump #1 C/B
8. Pump #2 C/B
9. ETM Pump #1
10. Blower1 C/B
11. Blower 2 C/B
12. Main C/B
13. Light C/B
14. ETM Pump #2
15. Pump #1 Run Light
16.Pump #2 HOA
17. Pump #2 Reset Pushbuttom
18. Light Test
19 Pump #1 Run Light
20.Pump #1 HOA
21. Pump #1 Reset Pushbuttom
22. Bell
23 Alarm Light on top of enclosure

24. GFI C/B
25. Seal Fail Pump #1
26. Seal Fail Pump #2

Instrumentation Control Panel (ICP)

1. Pump #1 Run
2. Pump #1 Fail
3. Pump #2 Run
4. Pump #2 Fail
5. High Wet Well
6. High Dry Well
7. Bubbler Fail
8. Power Fail

Dry Well Sump Pump

120V, Plug in type, operates with float

Exhaust Fan

120V, 1/4 HP, operates 24 hours (exhaust fan is corroded and should be replaced)

Code Violations

NFPA-820 (Provide gas detection system for wet well)

Structural:

Structural plans not available.
Wet well corrosion is moderate. No exposed reinforcing was observed.
Dry well is in good condition.

Recommendations:

Abandon the station.

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 20 (Laguna Canyon) **Date of Inspection:** Dec. 24, 2002

Mechanical Equipment:
Sewage pumps, Essco submersibles in a dry pit.
Pump run times: P1 = 2,010 hours, P2 = 1,780 hours
Bubbler operation range: 20" / 5"
Plans and specs have been prepared for elimination of the station. No detailed inspection was performed.

Electrical Equipment:
Emergency Power
240V, 60A, 3W, 4P Generator Plug
Motors
Pump #1 - 240V, 3 Phase, 3HP, Submersible type, Class 1, Groups C & D.
Pump #2 - 240V, 3 Phase, 3HP, Submersible type, Class 1, Groups C & D.
Duplex Pump Control Panel -
1. Alarm Reset
2. Level Display
3. High Water Alarm Light
4. Low Air Test Bottom
5. Manual Transfer Air Compressor
6. High Water Alarm Rest
7. Pump #1 C/B
8. Pump #2 C/B
9. ETM Pump #1
10. GFI Receptacle
11. Vent Fan
12. ETM Pump #2
13. Pump #1 Run Light
14. Pump #1 HOA
15. Pump #1 Reset Pushbuttom
16. Light Test
17. Pump #2 Run Light
18. Pump #2 HOA
19. Pump #2 Reset Pushbuttom
20. Seal Fail Pump #1
21. Seal Test Buttom
22. Seal Fail Pump #2

Instrumentation Control Panel (ICP)

1. Pump #1 Run
2. Pump #1 Fail
3. Pump #2 Run
4. Pump #2 Fail
5. High Wet Well
6. High Dry Well
7. Bubbler Fail
8. Power Fail

Exhaust Fan

120V, 1/4 HP, operates 24 hours (exhaust fan is corroded and should be replaced)

Code Violations

NFPA-820 (Provide gas detection system for wet well)

Structural:

Lift station will be abandoned. Detailed observation was not performed.

Recommendations:

None. The station is scheduled for abandonment.

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 21 (Bonn Drive) **Date of Inspection:** Dec. 24, 2002

Mechanical Equipment:

Sewage pumps, Wemco with rebuilt Essco impellers; unknown design point

Pump run times: P1 = 1,260 hours, P2 = 1,070 hours

Bubbler operation range: 40" / 10"

The station does not have a pump tee.

Electrical Equipment:

Emergency Power

460V, 60A, 3W, 4P Generator Plug

Motors

Pump #1 - 460V, 3 Phase, 15HP, Submersible type, Class 1, Groups C & D.

Pump #2 - 460V, 3 Phase, 15HP, Submersible type, Class 1, Groups C & D.

Duplex Pump Control Panel -

1. Low Air Alarm Light
2. Level Display
3. High Water Alarm Light
4. Low Air Reset Bottom
5. Power Transformer Lights
6. High Water Alarm Rest
7. Pump #1 C/B
8. Pump #2 C/B
9. Main C/B
10. ETM Pump #1
11. ETM Pump #2
12. Pump #1 Run Light
13. Pump #1 HOA
14. Pump #1 Reset Pushbuttom
15. Light Test
16. Pump #2 Run Light
17. Pump #2 HOA
18. Pump #2 Reset Pushbuttom

Instrumentation Control Panel (ICP)

1. Pump #1 Run
2. Pump #1 Fail
3. Pump #2 Run
4. Pump #2 Fail
5. High Wet Well
6. High Dry Well
7. Bubbler Fail
8. Power Fail

Note: ICP has 5 spaces

Dry Well Sump Pump

120V, Plug in type, operates with float

Exhaust Fan

120V exhaust fan is turned off due to neighbor complaining about noise.

Code Violations

1. NFPA-820 (Provide gas detection system for wet well)
2. NEC-501 (Provide explosion proof seals for conduits entering or leaving control panel)

Structural:

Plans are dated August, 1964.
Corrosion of wet well walls is minor. Ceiling corrosion is moderate.
Wet well ladder is severely corroded.
The dry well structure was observed to be in good condition.

Recommendations:

1. Schedule pump/motor replacement.
2. Install pumping tee in force main.
3. Apply protective lining to wet well interior to resist further concrete corrosion.
4. Replace exist. wet well ladder with SST ladder
5. Provide explosion proof seals for conduits entering or leaving the control panel
6. Provide gas detection system for wet well
7. Change lights and receptacles to Class I, Division 2 In the dry well.
8. Install generator unit.

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 22 (Arch Beach Heights) **Date of Inspection:** Dec. 24, 2002

Mechanical Equipment:
Sewage pumps, Essco
Pump run times: P1 = 3,450 hours, P2 = 3,190 hours
Bubbler operation range: 54" / 12"
Both pumps are submersible, in a 6' diameter wet well; there is also second adjacent 5' dia wet well.

The station does not have a pump tee.

Electrical Equipment:
Emergency Power
460V, 75 KVA Generator
Motors
Pump #1 - 460V, 3 Phase, 20HP, Submersible type, Class 1, Groups C & D.
Pump #2 - 460V, 3 Phase, 20HP, Submersible type, Class 1, Groups C & D.
Duplex Pump Control Panel -
1. Power On Light
2. Level Display
3. Air Pump Fail
4. Low Air Test Bottom
5. High or Low Level Alarm
6. Air Pump Fail Reset
7. High or low level resetPump #1 C/B
8. Alarm Silence
9. Emergency High Level Reset
10. Emergency High Level
11. ETM Pump #1
12. Pump #1 C/B
13. Pump #2 C/B
14. ETM Pump #2
15. Pump #1 Run Light
16. Pump #1 HOA
17. Pump #1 Reset Pushbuttom
18. Light Test
19. Pump #2 Run Light
20. Pump #2 HOA
21. Pump #2 Reset Pushbuttom
22. Seal Fail Pump #1

23. Seal Fail Pump #2
24. Seal Fail Test
Note: No drywell only two wetwells

Instrumentation Control Panel (ICP)

1. Pump #1 Run
2. Pump #1 Fail
3. Pump #2 Run
4. Pump #2 Fail
5. High Wet Well
6. High Dry Well
7. Bubbler Fail
8. Power Fail
9. Generator Fail
10. Generator Run

Note: ICP has 5 spaces

Code Violations

Provide explosion-proof seals between wet well and bubbler panel.

Structural:

Plans dated June, 1994.
Reinforced concrete circular wet wells.
Epoxy-coated wet well concrete corrosion is minor.
The dry portions of the structure were observed to be in good condition.

Recommendations:

Abandon the station.

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 23 (Old Top of the World) **Date of Inspection:** Dec. 24, 2002

Mechanical Equipment:
Sewage pumps, Davis-EMU submersibles, located in the wet well
Pump run times: P1 = 8,130 hours, P2 = 6,730 hours
Bubbler operation range: 55" / 18"
Pumps are braced to station walls.
There is a bioxide storage tank; chemical is fed only during the summer.

Electrical Equipment:
Emergency Power
460V, 30KW Generator
Motors
Pump #1 - 460V, 3 Phase, 7 1/2HP, Submersible type, Class 1, Groups C & D.
Pump #2 - 460V, 3 Phase, 7 1/2HP, Submersible type, Class 1, Groups C & D.
Duplex Pump Control Panel -
1. Low Air Alarm Light
2. Level Display
3. High Water Alarm Light
4. Alarm Silence Pushbuttom
5. Manual Transfer Air Compressor
6. Wet well high level alarm silence reset
7. Pump #1 C/B
8. Pump #2 C/B
9. Main C/B
10. ETM Pump#1
11.ETM Pump #2
12. Duplex Receptacle
13. Pump #1 Run Light
14.Pump #1 HOA
15. Pump #1 Reset Pushbuttom
16. Light Test
17. Pump #2 Run Light
18. Pump #2 HOA
19. Pump #2 Reset Pushbuttom
20. Bell
21 Alarm Light on top of enclosure
22. GFI C/B

23. Seal Fail Pump #1
24. Seal Fail Pump #2

Instrumentation Control Panel (ICP)

1. Pump #1 Run
2. Pump #1 Fail
3. Pump #2 Run
4. Pump #2 Fail
5. High Wet Well
6. High Dry Well
7. Bubbler Fail
8. Power Fail
9. Generator Fail

Dry Well Sump Pump

120V, Plug in type, operates with float

Code Violations

1. NFPA-820 (Provide gas detection system for wet well)
2. NEC-501 (Provide explosion proof seals for conduits entering or leaving control panel)

Structural:

Structural plans not available.
Circular concrete wet well is in good condition.
Below-grade generator vault is in good condition.

Recommendations:

1. Schedule pump/motor replacement.
2. Install pumping tee in force main.
3. Provide explosion proof seals for conduits entering or leaving the control panel
4. Provide gas detection system for wet well

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 24 (Nyes Place) **Date of Inspection:** Dec. 18, 2002

Mechanical Equipment:

Sewage pumps, Essco submersibles in wet pit

Pump run times: P1 = 12,100 hours, P2 = 13,210 hours

Bubbler operation range: 43" / 18"

The engine-generator unit is located in an underground vault; the pump control panel is also in the vault.

Generator is Kohler, 60 kw.

Pump discharge is downhill; disharge piping was retrofitted with air release valves to avoid air binding. If there is a problem with the pump station, it can gravity flow to the LS #26 system.

Electrical Equipment:

Emergency Power

240V, 3 Phase, 60KW Underground Generator And underground transfer switch

Motors

Pump #1 - 240V, 3 Phase, 10HP, Submersible type, Class 1, Groups C & D.

Pump #2 - 240V, 3 Phase, 10HP, Submersible type, Class 1, Groups C & D.

Duplex Pump Control Panel -

1. Low Air Alarm Light
2. Level Display
3. High Water Alarm Light
4. Low Air Test Bottom
5. Manual Transfer Air Compressor
6. High Water Alarm Rest
7. Pump #1 C/B
8. Pump #2 C/B
9. ETM Pump #1
10. Blower C/B
11. Light C/B
12. ETM Pump #2
13. Pump #1 Run Light
14. Pump #1 HOA
15. Pump #1 Reset Pushbuttom
16. Light Test
17. Pump #1 Run Light
18. Pump #1 HOA
19. Pump #1 Reset Pushbuttom

Instrumentation Control Panel (ICP)

1. Pump #1 Run
2. Pump #1 Fail
3. Pump #2 Run
4. Pump #2 Fail
5. High Wet Well
6. High Dry Well
7. Bubbler Fail
8. Power Fail

Exhaust Fan

120V, 1/4 HP, operates 24 hours

Supply Fan

A supply fan may need to be installed, the fresh air may help with the corrosion problem in the dry well.

Conduit Bodies

Conduit Body for bubbler tube is missing.

Code Violations

1. NFPA 820 (Provide gas detection system for wet well)
2. The wet well is a fiber glass enclosure in the dry well, the dry well should be class 1, Division 1 rated.
3. The station has a pump tee.
4. NEC-501 (Provide explosion proof seals for conduits entering or leaving control panel)

Structural:

6' diameter x 15' deep wet well. Plans dated August 1990.
Reinforced concrete circular wet well was observed to be in good condition.
Generator and valve vault structures were observed to be in good condition.

Recommendations:

1. Install pumping tee in force main.
2. Schedule pump/motor replacement.
3. Provide gas detection system for wet well

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 25 (Laguna SOCWA) **Date of Inspection:** Dec. 12, 2002

Mechanical Equipment:

Air compressor, Worthington 6/6/4-1/2x2-1/2, Serial No. 876

Originally used to inject air into the station discharge. Now used to recharge surge tank and for air tools.

Sewage pumps, Fairbanks Morse 6x10, Fig. B5446, Design Point 1,630 gpm @ 90' head

Serial No. KC31085091, Imp dia = 16.5"

Pumps P1 and P2 are variable speed (VFD)

Pump run times: P1 = 56,000 hours, P2 = 20,000 hours, P3 = 330 hours, P4 = 140 hours

Bubbler operation range: 11.0' / 5.0'

Pumps are braced to station walls.

Plug valves in suction line installed as replacements for original knife gate valves.

Valves are M&H Model 0820. Reported problem is that material gets hung up on the internals.

Resilient wedge gate valves in discharge line installed as replacements for original knife gate valves.

The station has a pump tee.

Electrical Equipment:

Emergency Power:

Engine-generator, generator is Marathon, 350kw, Model 680FDF4612FFW, Serial No. HN-92729-12/13

Motors

Pump #1 - 480V, 3 Phase, 60HP, Class 1, Groups C & D. Controlled via VFD #1.

Pump #2 - 480V, 3 Phase, 60HP, Class 1, Groups C & D. Controlled via VFD #2

Pump #3 - 480V, 3 Phase, 60HP, Class 1, Groups C & D. Controlled via Autotransf

Pump #4 - 480V, 3 Phase, 60HP, Class 1, Groups C & D. Controlled via Autotransf

Air Compressor

480V, 3 Phase, 15HP.

Air Compressor is corroded

Pump #1 & #2 (VFD #1 & VFD #2)

1. High Alarm
2. Lead Pump Start
3. Lead Pump Max Speed
4. Lead Pump Min Speed

5 Lead Pump Stop

6. Lag Pump Stop
7. Lag Pump Max Speed
8. Lag Pump Min Speed
9. Lag Pump Stop

10. Low Alarm

Note: Only one pump is required to control the flow

Pump #3 & Pump #4 (Autotransformer #1 & #2)

1. High Alarm
2. Lead Pump Start
3. Lead Pump Stop
4. Lag Pump Start
5 Lag Pump Stop
6. Low Level Alarm

Pump Control Panel

1. Pump #1 Running
2. Pump #2 Running
3. Pump #3 Running
4. Pump #4 Running
5. Pump #1 Fail
6. Pump #2 Fail
7. Pump #3 Fail
8. Pump # 4 Fail
9. Wet Well Level High
10. Wet Well Level Low
11. Bubbler System Low Air Pressure
12. Common Failure Reset
13. Compressor Duty
14. UPS Engaged System
15. UPS system Failed
16. UPS On/Off
17. VS Check Valve Alarm 1
18. VS Check value Alarm 2

Instrumentation Control Panel (ICP)

1. VFD #1 Run
2. VFD #1 Fail
3. VFD #2 Run
4. VFD #2 Fail
5. Pump #3 Run
6. Pump #3 Fail
7. Pump #4 Run
8. Pump # 4 Fail
9. High Level
10. Power Fail
11. ATS Switched Over

Note: ICP has one space

Dry Well

1. Sump Pump-120V, Plug in type, operates with float
2. Sump pump receptacle is very corroded and should be replaced
3. Exhaust Fan-480V, 3 Phase

Generator Room

1. Exposed Metal is Corroded
2. Generator Has oil leaks and no oil containment
3. Clearance from generator to diesel tank is less than 3 feet

Code Violations

1. NFPA 820 (Provide gas detection system for wet well)
2. NEC-501 (Provide explosion proof seals for conduits entering or leaving control panel)

Structural:

Reinforced concrete structure constructed in early 1980's. Wet well is 8'-4" x 34'-8" x 28' (approx.) deep.
A sprayed epoxy lining was applied to the inside surfaces approximately one year ago.
The wet well interior surfaces were covered by significant amounts of
loose materials and staining that limited the surface visibility.
The north, south and west walls are severely corroded. Reinforcing steel appears to be exposed in some areas of those walls. Portions of lining appear to be missing. Much of the concrete has corroded and fallen off.
The east wall and the soffit of the deck slab are mildly corroded.
The observed condition of the dry portion of the structure is good.

Recommendations:

1. Schedule pump/motor replacement.
2. According to staff, apparent exposed reinforcing and missing portions of the lining are caused by surface deposits that obscure the lining.
   Verify that the existing lining is in sound condition by removing surface materials to expose the lining for additional observance.
3. Replace corroded electrical equipment.
4. Provide explosion proof seals for conduits entering or leaving control panel.
5. Provide gas detection system for wet well.

City of Laguna Beach
Sewer Lift Station Evaluation
Inspection Observations

Lift Station No.: 26 (Bluebird SOCWA) **Date of Inspection:** Dec. 12, 2002

Mechanical Equipment:

Air compressor, Worthington 6/6/4-1/2x2-1/2, Serial No. 878

Originally used to inject air into the station discharge. Now used to recharge surge tank and for air tools.

Sewage pumps, Fairbanks Morse 8x12, Fig. B5446, Design Point 2,040 gpm @ 108' head

Serial No. K3C1085093-1, Imp dia = 17.8"

Pumps P1 and P2 are variable speed (VFD)

Pump run times: P1 = 54,140 hours, P2 = 25,660 hours, P3 = 150 hours, P4 = 180 hours

Bubbler operation range: 9.4' / 5.5'

Pumps are braced to station walls.

Plug valves in suction line installed as replacements for original knife gate valves.

Valves are M&H Model 0820. Reported problem is that material gets hung up on the internals.

Equipment removal very difficult, with the street level is below and away from the point where the equipment would leave the building. Suggest extending the street level toward the building and providing a monorail to a point accessible by truck.

The station has a pump tee.

Electrical Equipment:

Emergency Power

480V, 515KW, 3 Phase

Motors

Pump #1 - 480V, 3 Phase, 150HP. Controlled via VFD #1.
Pump #2 - 480V, 3 Phase, 150HP. Controlled via VFD #2
Pump #3 - 480V, 3 Phase, 150HP. Controlled via Autotransformer
Pump #4 - 480V, 3 Phase, 150HP Controlled via Autotransformer

Air Compressor

480V, 3 Phase, 20HP.

Pump #1 & #2 (VFD #1 & VFD #2)

1. Hand/Off/Auto
2. Manual Speed
3. Pump Running
4. VFD Fault

5 Emergency Stage Activated

6.ETM

Note: Only one pump is required to control the flow

Pump #3 & Pump #4 (Autotransformer #1 & #2)

1. High Alarm
2. Lead Pump Start
3. Lead Pump Stop
4. Lag Pump Start
5 Lag Pump Stop
6. Low Level Alarm

Pump Control Panel

1. Pump #1 Running
2. Pump #2 Running
3. Pump #3 Running
4. Pump #4 Running
5. Pump #1 Fail
6. Pump #2 Fail
7. Pump #3 Fail
8. Pump # 4 Fail
9. Wet Well Level High
10. Wet Well Level Low
11. Bubbler System Low Air Pressure
12. Common Failure Reset
13. Compressor Duty
14. UPS Engaged System
15. UPS system Failed
16. UPS On/Off
17. VS Check Valve Alarm 1
18. VS Check value Alarm 2

Instrumentation Control Panel (ICP)

1. VFD #1 Run
2. VFD #1 Fail
3. VFD #2 Run
4. VFD #2 Fail
5. Pump #3 Run
6. Pump #3 Fail
7. Pump #4 Run
8. Pump # 4 Fail
9. High Level
10. Power Fail
11. ATS Switched Over

Dry Well

1. Sump Pump-120V, Plug in type, operates with float
2. No grate on sump pump.
3. Exhaust Fan-480V, 1 1/2 HP, 3 Phase

Generator Room

1. Exposed Metal is Corroded
2. Generator Has oil leaks and no oil containment
3. Clearance from generator to air ducts is less than 3 feet

Code Violations

1. NFPA 820 (Provide gas detection system for wet well)
2. NEC-501 (Provide explosion proof seals for conduits entering or leaving control panel)

Structural:

Reinforced concrete structure constructed in early 1980's. Wet well is 7'-7" x 33'-0" x approximately 30' below the sidewalk level. Wet well access is through a square shaft from the sidewalk.
A sprayed epoxy lining was applied to the inside surfaces approximately one year ago.
Ventilation of the wet well was not successful in achieving safe levels of H2S and O2 in the access shaft. Therefore, wet well observation was not possible. Minor concrete pitting was observed in the upper portion of the access shaft.
The dry portions of the structure were observed to be in good condition.

Recommendations:

1. Schedule pump/motor replacement.
2. Remove surface materials and staining by steam-cleaning or other means and provide adequate ventilation to allow safe access for additional observation.
3. Replace corroded electrical equipment
4. Provide explosion proof seals for conduits entering or leaving control panel
5. Provide gas detection system for wet well
6. Consider extending the monorail system to facilitate equipment removal. Will involve extending roadway from parking area to allow truck to back in.

Appendix B

Photo numbering convention:
x-y, x = Lift Station No.
y = Photo No.

APPENDIX B
LIFT STATION
PHOTOGRAPHS

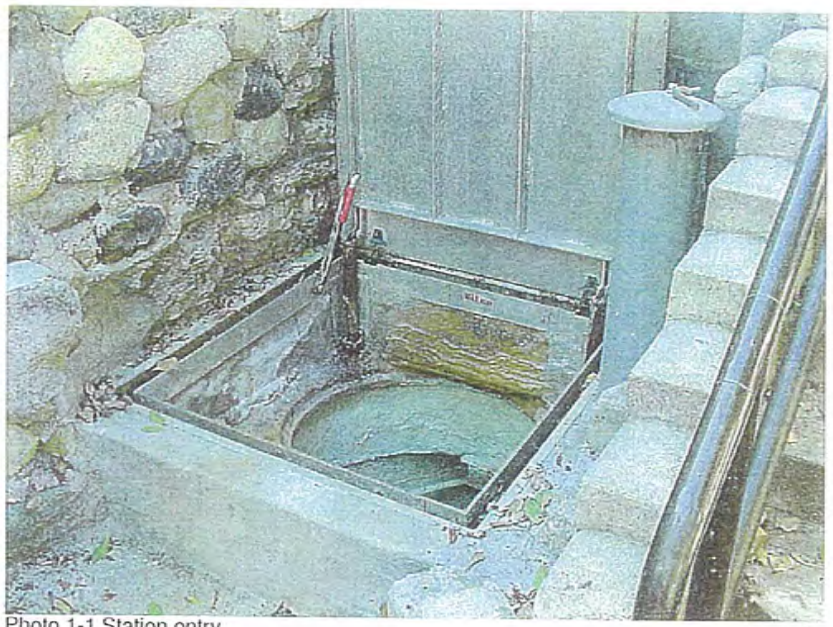


Photo 1-1 Station entry
MVC-170F.JPG
12/18/2002 (Wed), 2:49 PM

Photo 1-2 Submersible pumps
MVC-170F50.JPG
12/18/2002 (Wed), 3:12 PM

Photo 2-1 Pump Control Panel
Photo2-1.jpg
03/14/2003 (Fri), 8:48 AM

Photo 2-2 Wet Well Entry
Photo2-2.jpg
03/14/2003 (Fri), 8:48 AM

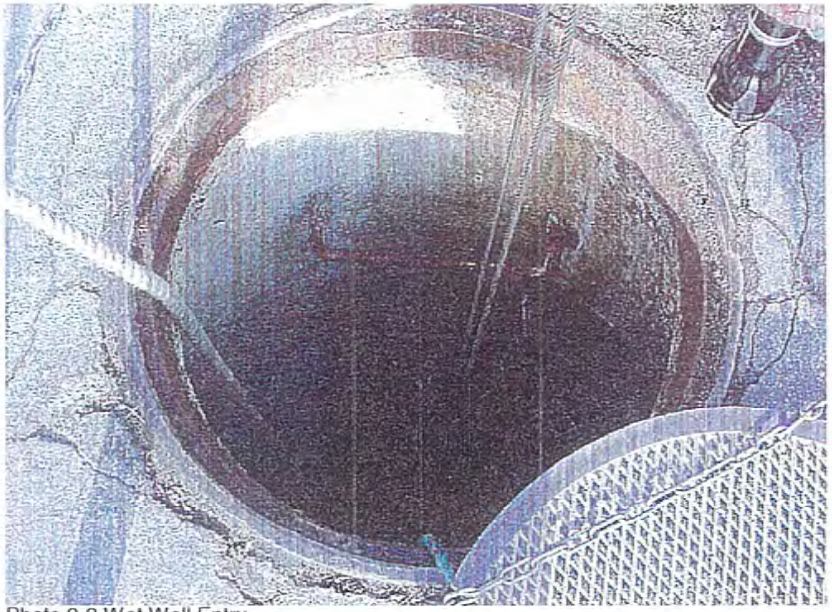


Photo 2-3 Wet Well Entry
Photo2-3.jpg
03/14/2003 (Fri), 8:48 AM

Photo 2-4 Pump and discharge line
Photo2-4.jpg
03/14/2003 (Fri), 8:49 AM

PHOTO 2-5□□PUMP BASE CORROSION
12/24/2002 (Tue), 10:21 AM

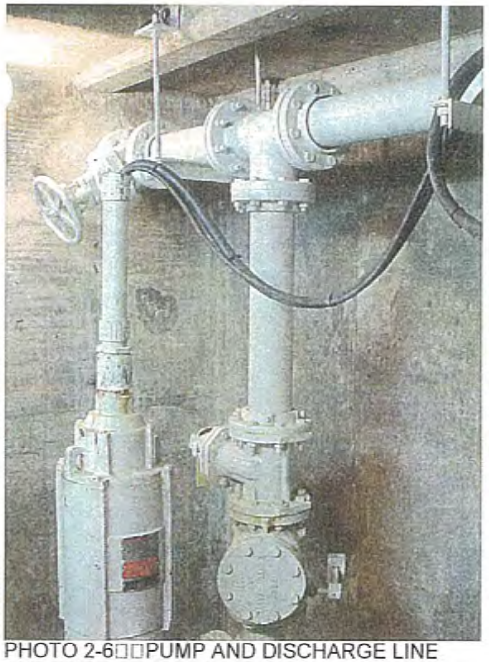


PHOTO 2-6□□PUMP AND DISCHARGE LINE
12/24/2002 (Tue), 10:20 AM

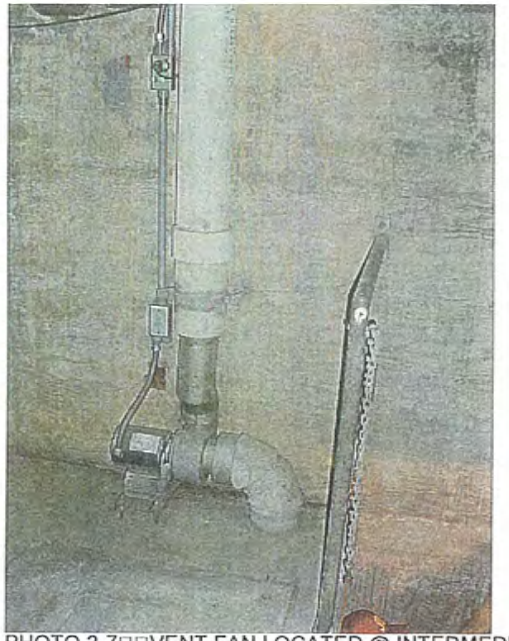


PHOTO 2-7□□VENT FAN LOCATED @ INTERMEDIATE LEVEL
12/24/2002 (Tue), 10:16 AM

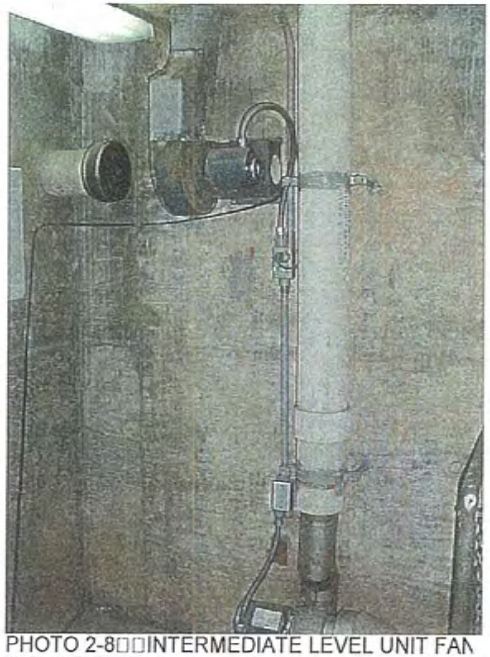


PHOTO 2-8□□INTERMEDIATE LEVEL UNIT FAN
12/24/2002 (Tue), 10:16 AM

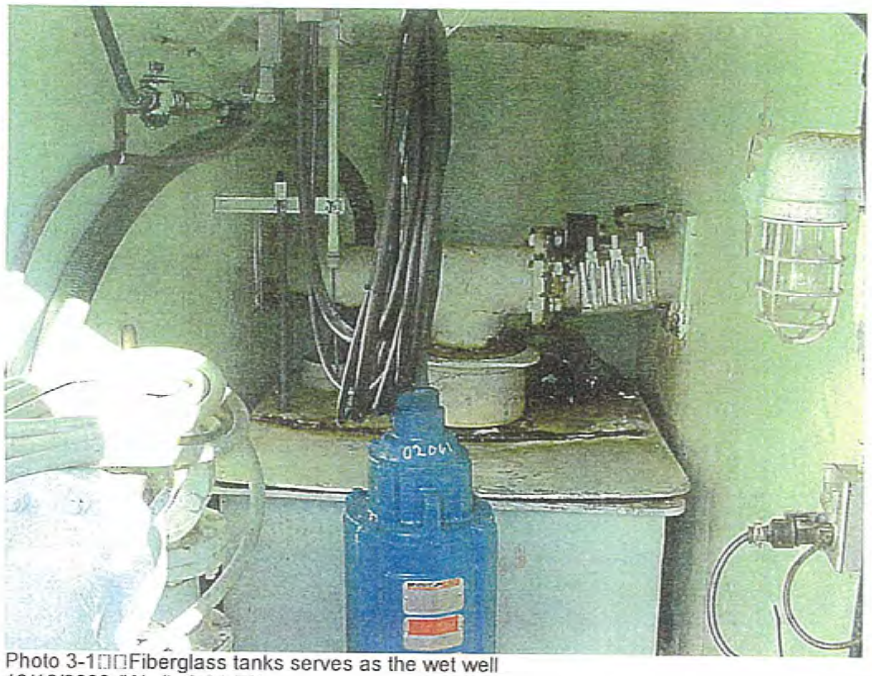


Photo 3-1□□Fiberglass tanks serves as the wet well
12/18/2002 (Wed), 2:31 PM

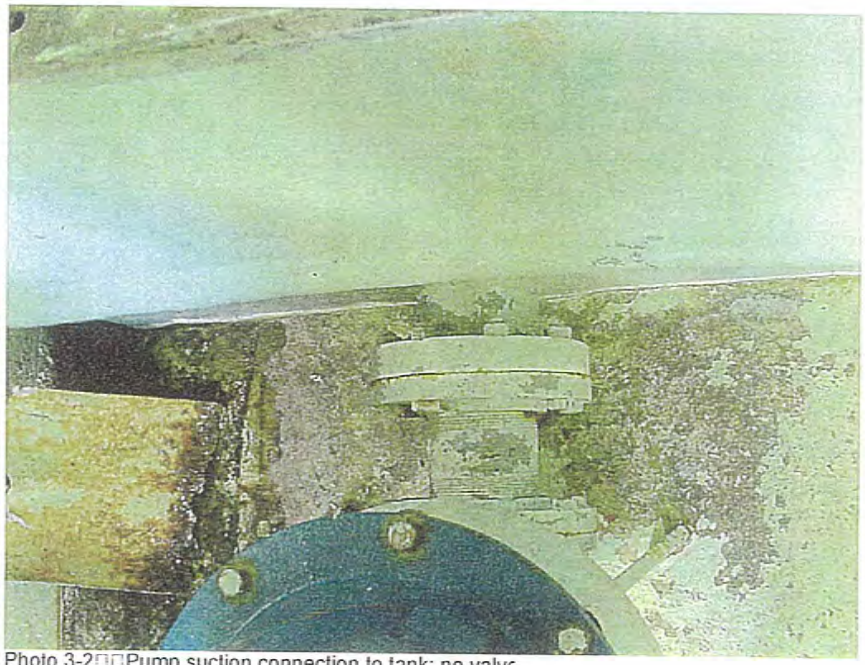


Photo 3-2□□Pump suction connection to tank; no valve
12/18/2002 (Wed), 2:31 PM

Photo 3-3□□Station entry
12/18/2002 (Wed), 2:33 PM

Photo 3-4□□SCADA panel
12/18/2002 (Wed), 2:34 PM

Photos 4-1 Corroded electrical box
MVC-160F.JPG
12/18/2002 (Wed), 2:14 PM

Photo 4-2 Corroded steel floor plate
MVC-161F.JPG
12/18/2002 (Wed), 2:14 PM

Photo 4-3 Corroded control panel
MVC-162F.JPG
12/18/2002 (Wed), 2:14 PM

Photo 4-4 Discharge piping, Severe corrosion of floor plate
MVC-163F.JPG
12/18/2002 (Wed), 2:14 PM

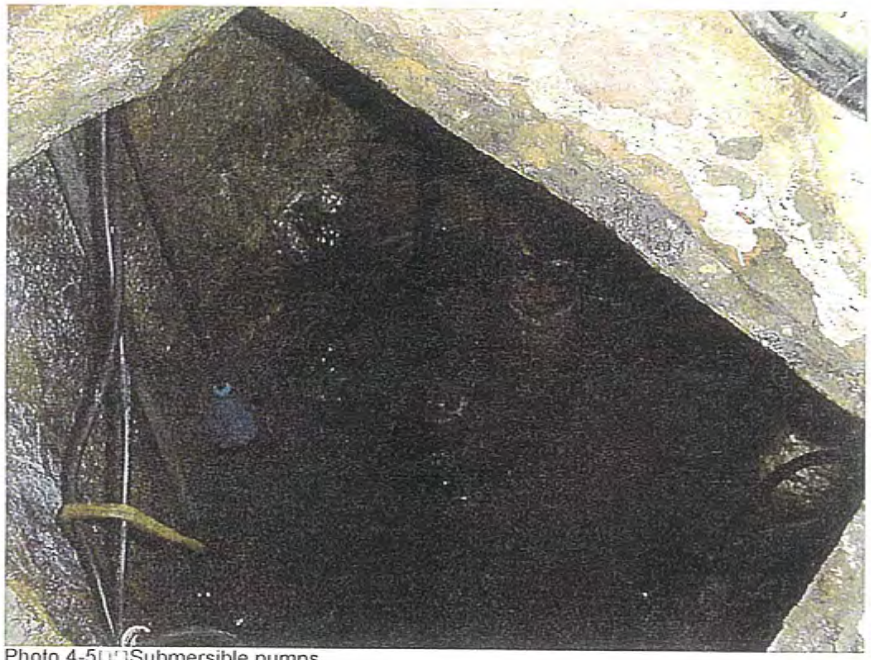


Photo 4-5 Submersible pumps
12/18/2002 (Wed), 2:15 PM

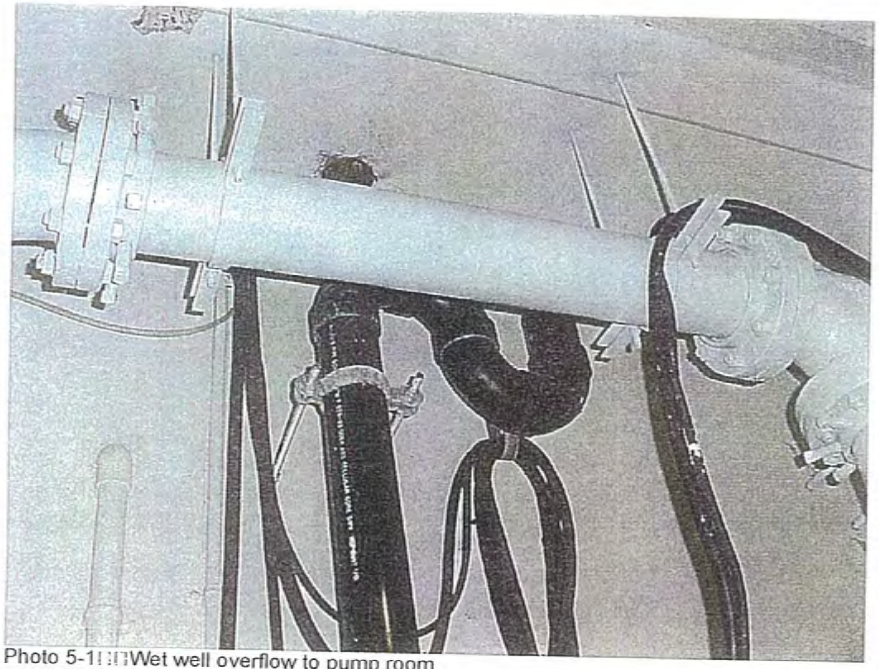


Photo 5-1 Wet well overflow to pump room
12/18/2002 (Wed), 1:48 PM

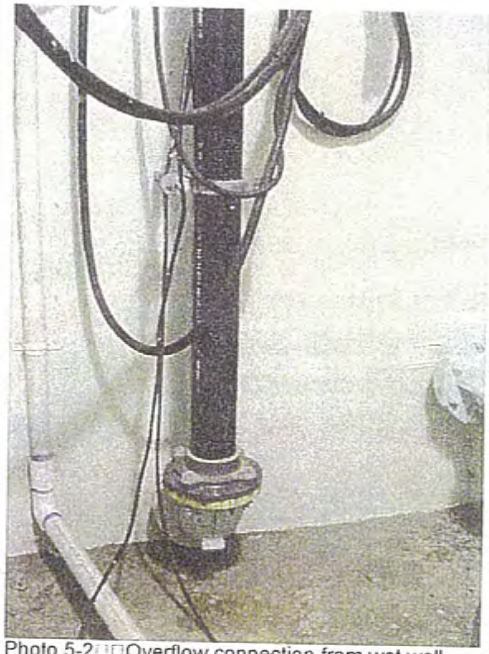


Photo 5-2 Overflow connection from wet well
12/18/2002 (Wed), 1:48 PM

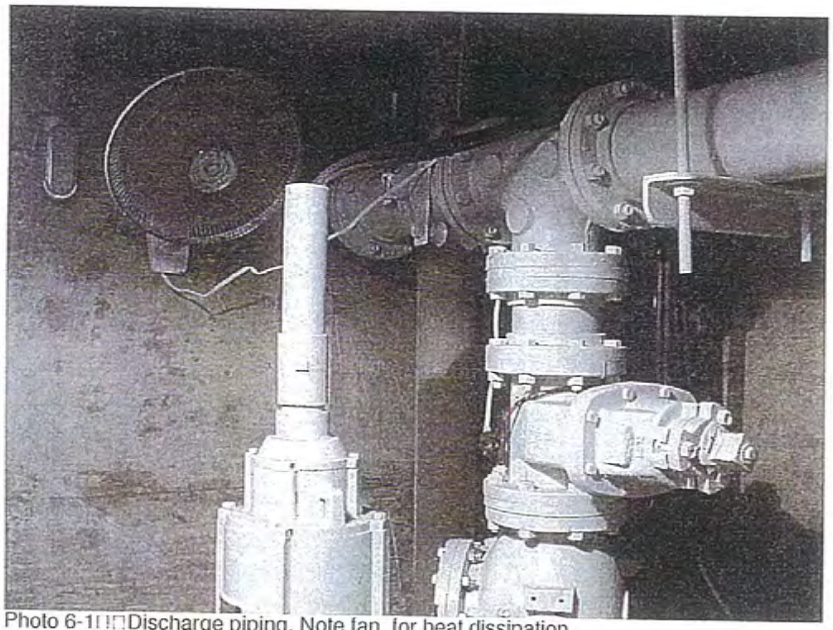


Photo 6-1 Discharge piping. Note fan for heat dissipation
MVC-153F.JPG
12/18/2002 (Wed), 1:30 PM

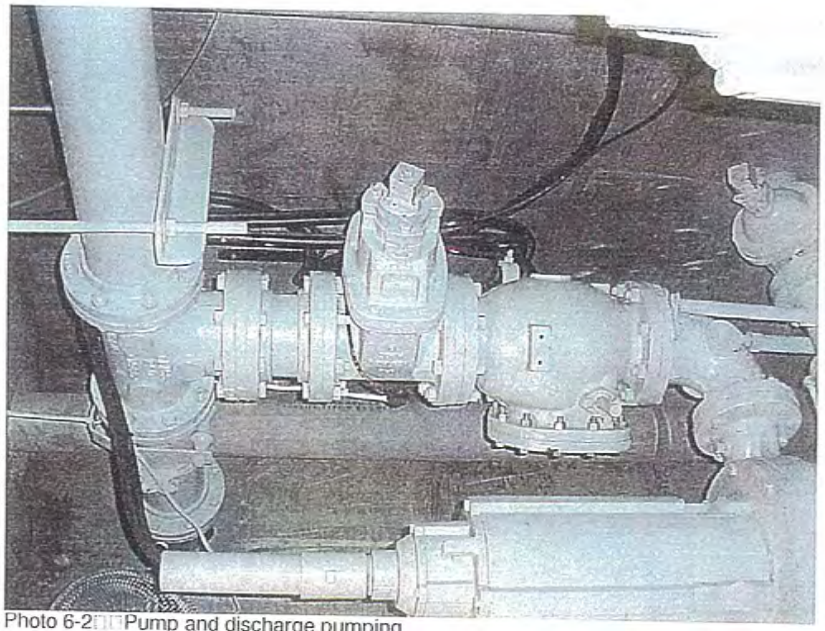


Photo 6-2 Pump and discharge pumping
MVC-154F.JPG
12/18/2002 (Wed), 1:30 PM

Photo 6-3 Pump and discharge piping
MVC-155F.JPG
12/18/2002 (Wed), 1:31 PM

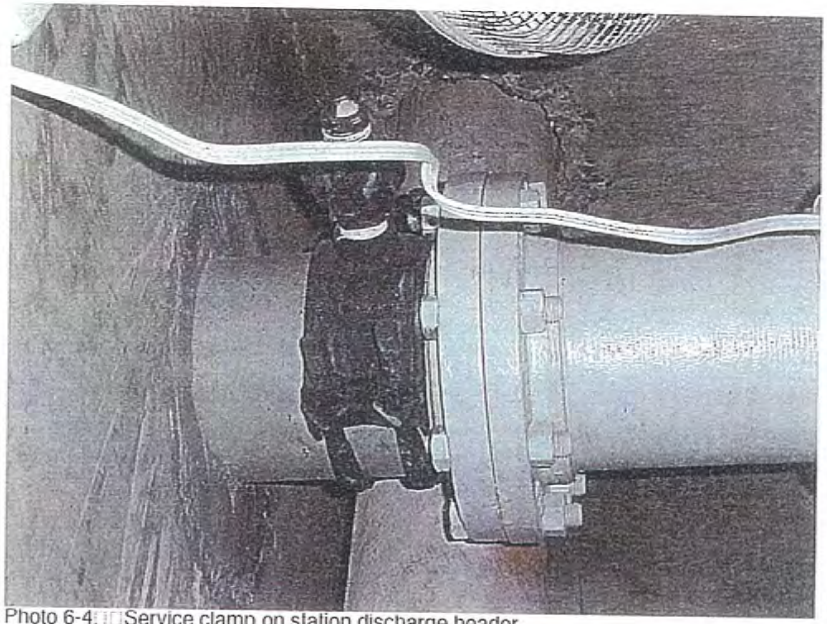


Photo 6-4 Service clamp on station discharge header
MVC-156F.JPG
12/18/2002 (Wed), 1:32 PM

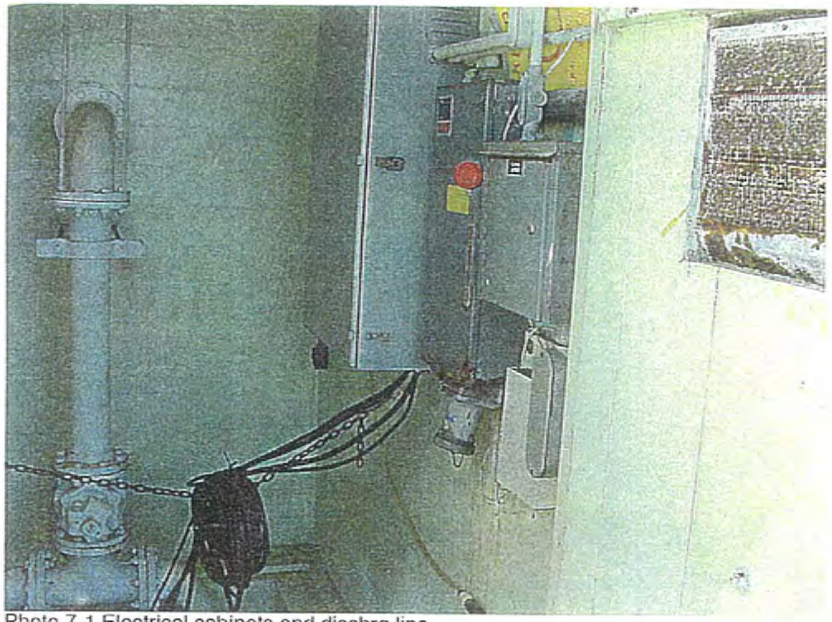


Photo 7-1 Electrical cabinets and dischrg line
MVC-143F.JPG
12/18/2002 (Wed), 11:50 AM

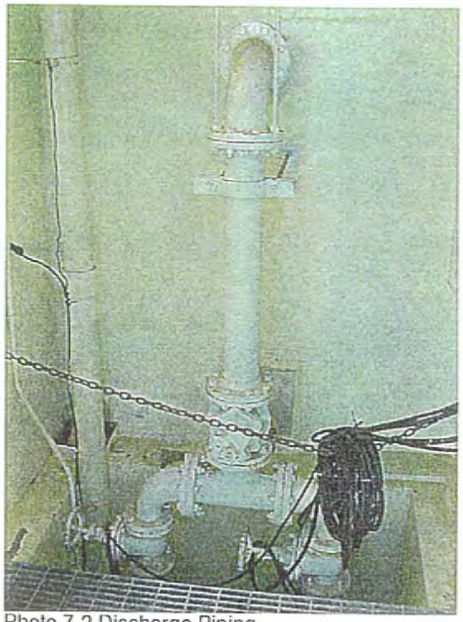


Photo 7-2 Discharge Piping
MVC-144F.JPG
12/18/2002 (Wed), 11:50 AM

Photo 8-1□□Control panel
12/18/2002 (Wed), 12:47 PM

8-2□□Fan for heat dissipation
12/18/2002 (Wed), 12:51 PM

Photo 8-3□□Wet well overflow piping
12/18/2002 (Wed), 12:52 PM

Photo 8-4□□Pump discharge
12/18/2002 (Wed), 12:53 PM

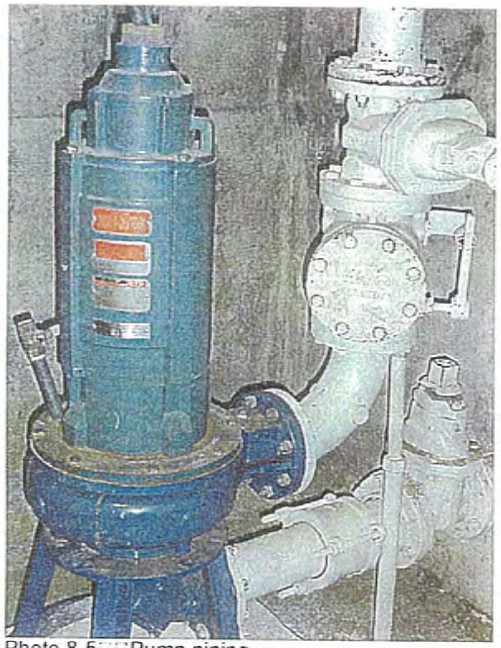


Photo 8-5 Pump piping
12/18/2002 (Wed), 12:53 PM

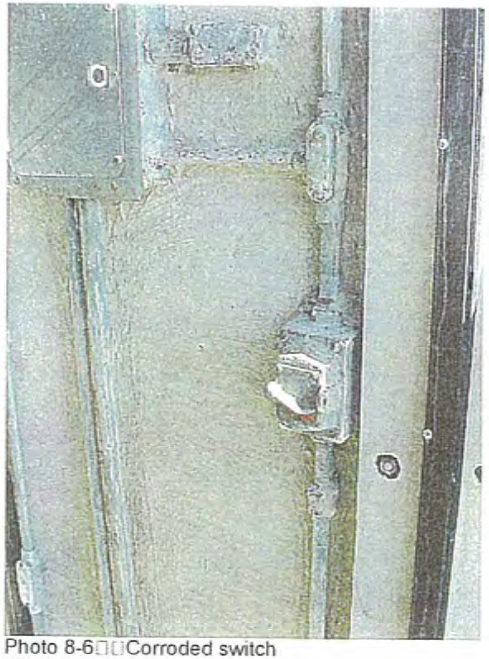


Photo 8-6 Corroded switch
12/18/2002 (Wed), 12:58 PM

Photo 9-1 Electrical Panels
12/18/2002 (Wed), 3:28 PM

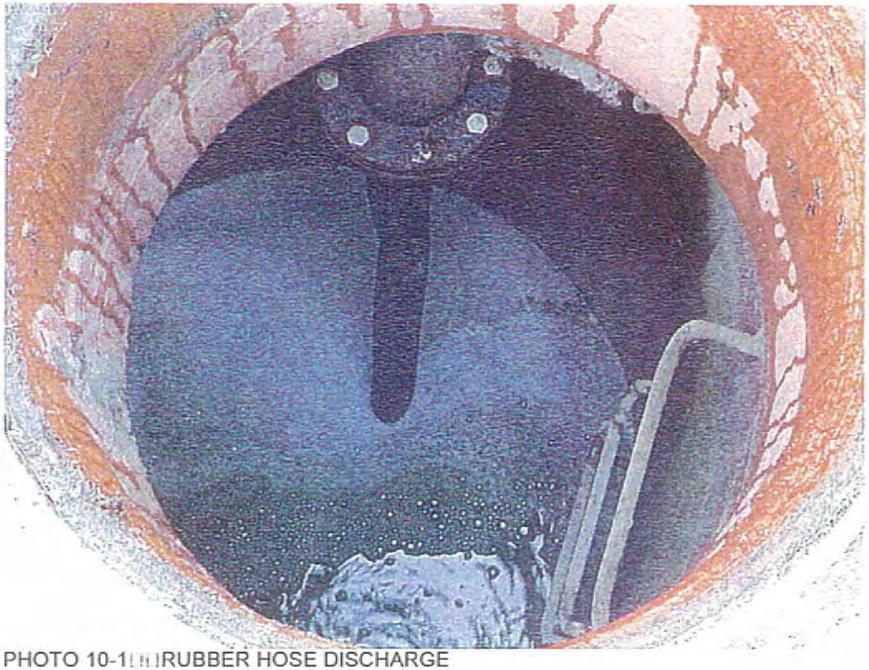


PHOTO 10-1 RUBBER HOSE DISCHARGE
12/24/2002 (Tue), 9:14 AM

PHOTO 10-2 PUMP TURNED ON TO LOWER WET WELL LEVEL
12/24/2002 (Tue), 9:21 AM

Photo 11-1 Station Entry
2-500014.JPG
12/24/2002 (Tue), 9:57 AM

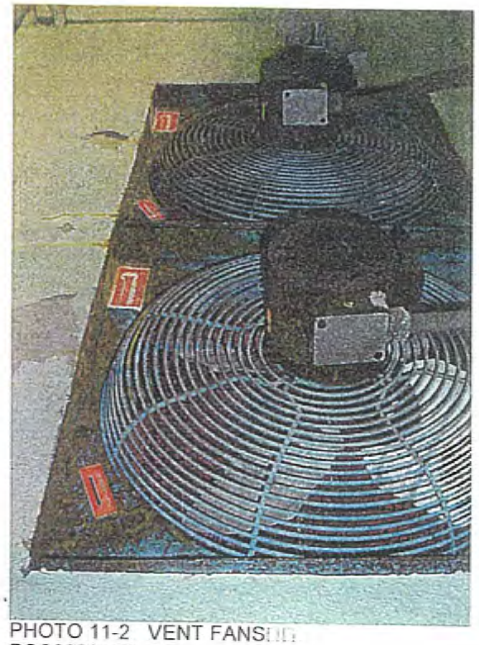


PHOTO 11-2 VENT FANS
DSC0000100.JPG
12/24/2002 (Tue), 9:40 AM

PHOTO 11-3 ENGINE/GENERATOR
DSC0000110.JPG
12/24/2002 (Tue), 9:41 AM

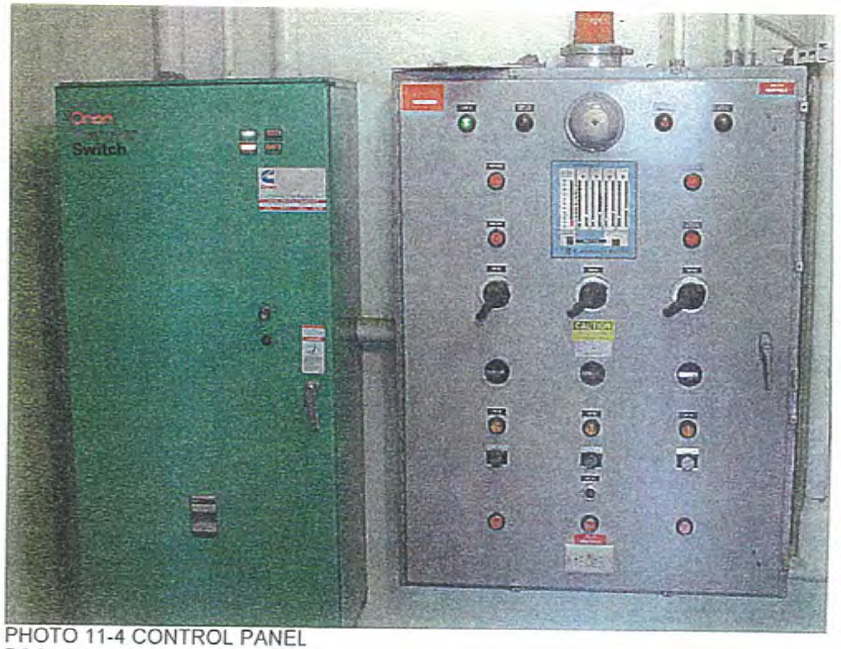
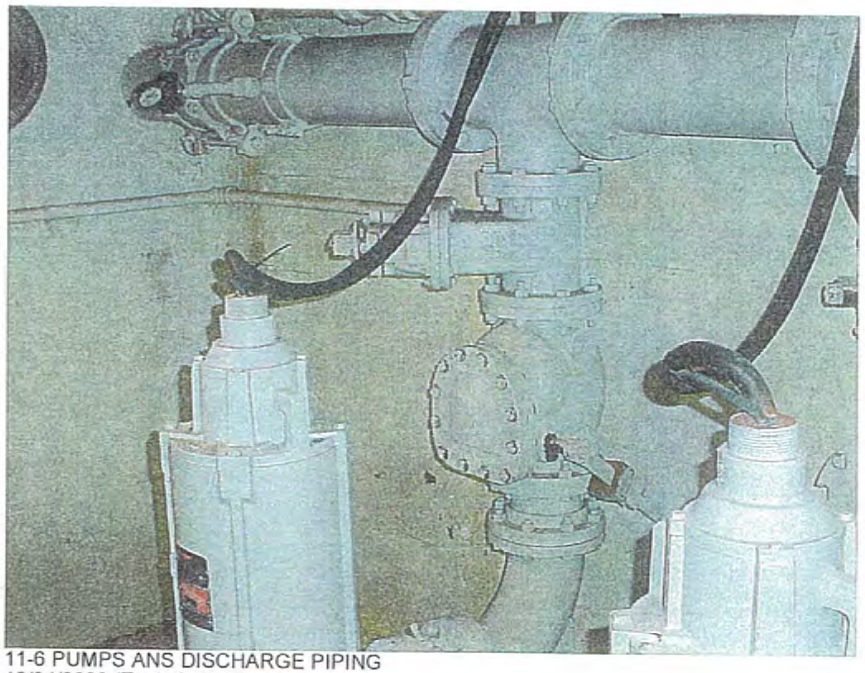


PHOTO 11-4 CONTROL PANEL
DSC0000120.JPG
12/24/2002 (Tue), 9:41 AM

PHOTO 11-5 DOORWAY ENTRANCE TO WET WELL
12/24/2002 (Tue), 9:56 AM



11-6 PUMPS ANS DISCHARGE PIPING
12/24/2002 (Tue), 9:42 AM

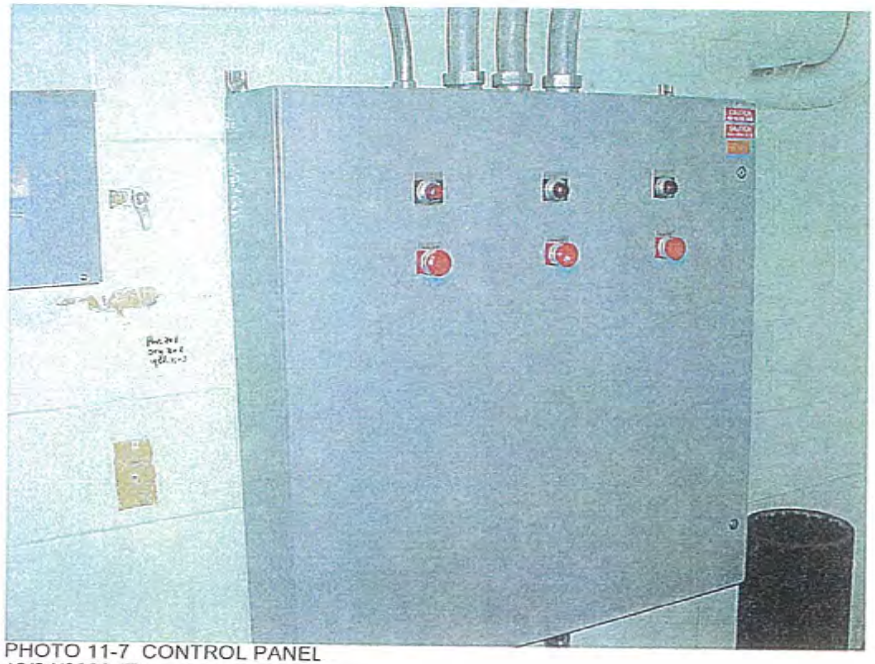


PHOTO 11-7 CONTROL PANEL
12/24/2002 (Tue), 9:56 AM

PHOTO 11-8 BIOXIDE STORAGE TANKS
12/24/2002 (Tue), 9:54 AM

Photo 12-1□□Control panel
12/18/2002 (Wed), 11:26 AM

Photo 12-2□□Wet well with discharge piping
12/18/2002 (Wed), 11:27 AM

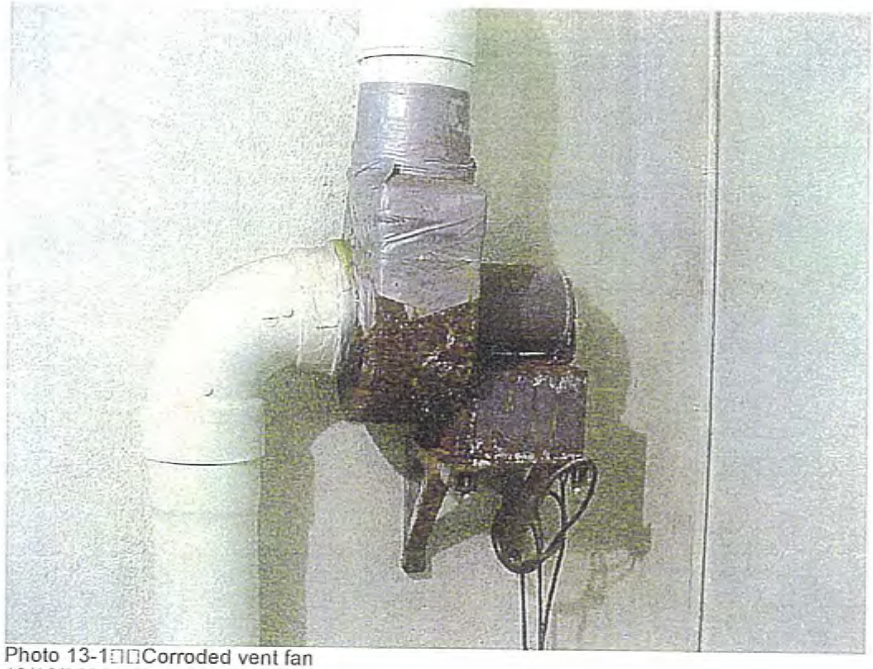


Photo 13-1□□Corroded vent fan
12/18/2002 (Wed), 11:09 AM

Photo 13-2□□Corroded transfer switch panel
12/18/2002 (Wed), 11:10 AM

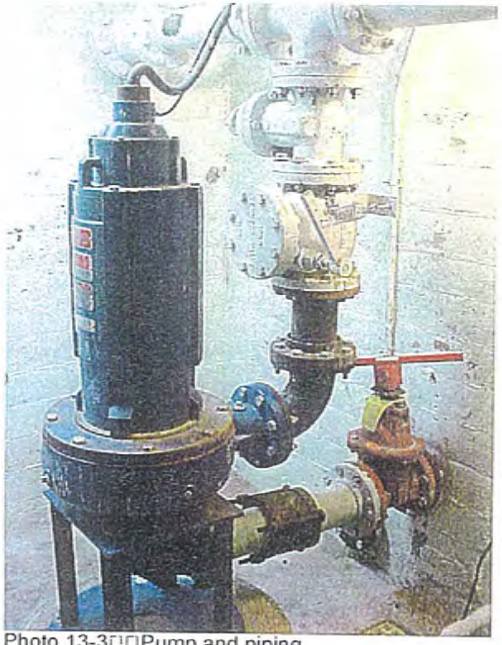


Photo 13-3□□Pump and piping
12/18/2002 (Wed), 11:16 AM

Photo 13-4□□Station and stairway access
12/18/2002 (Wed), 11:17 AM

Photo 13-5 Minor storm drain flow. In Summer, plate is replaced with grate for diversion to wet we
MVC-139F.JPG
12/18/2002 (Wed), 11:20 AM

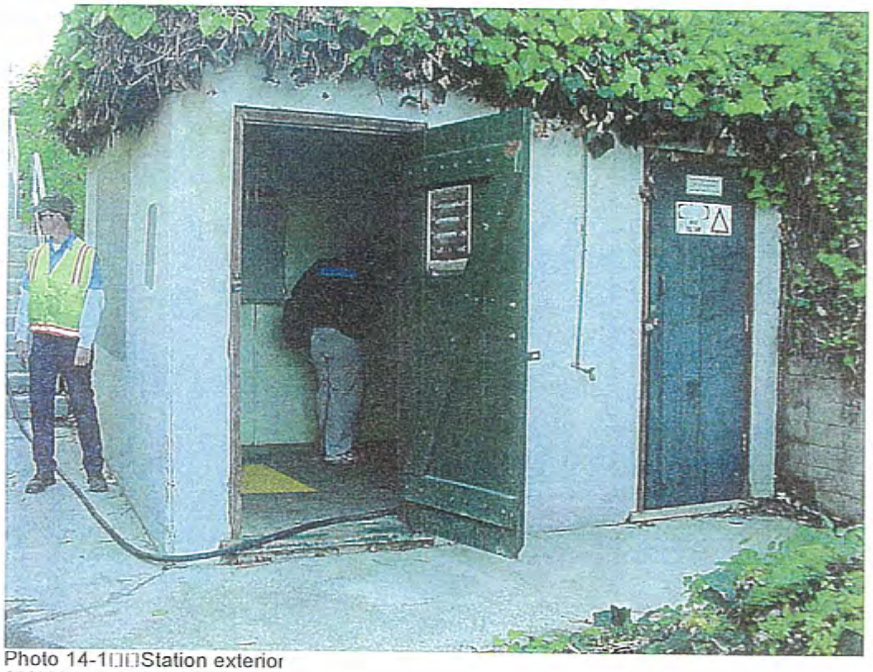


Photo 14-1□□Station exterior
12/18/2002 (Wed), 8:51 AM

Photo 14-2□□Pump control panel
12/18/2002 (Wed), 8:52 AM

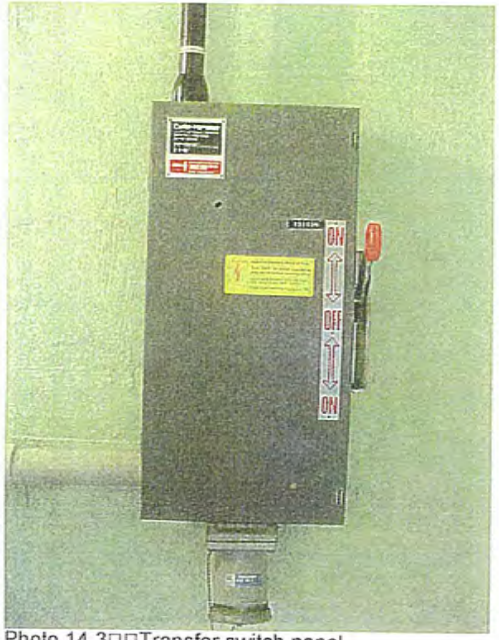


Photo 14-3□□Transfer switch panel
12/18/2002 (Wed), 9:07 AM

Photo 14-4□□pump and piping
12/18/2002 (Wed), 9:12 AM

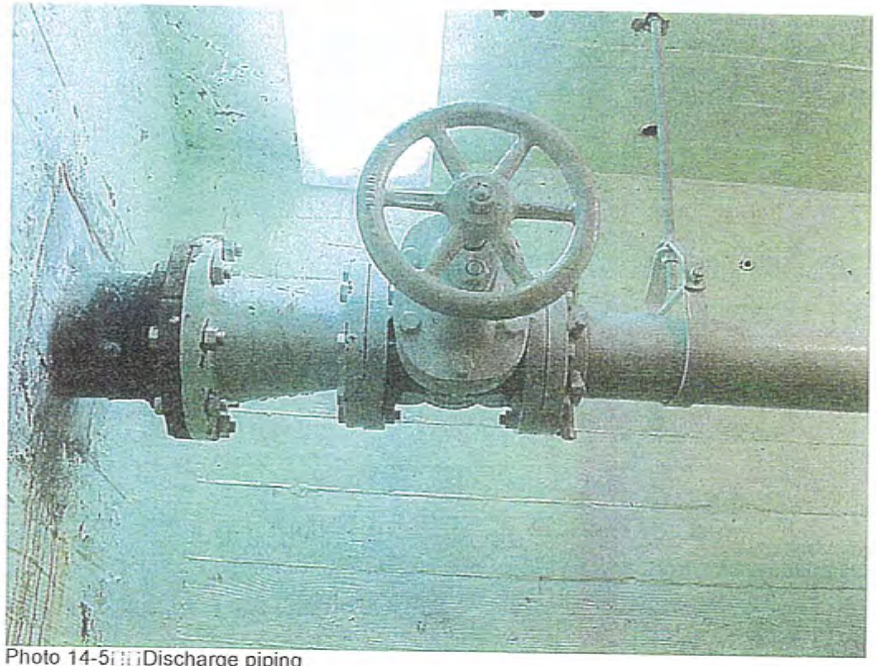


Photo 14-5 Discharge piping
12/18/2002 (Wed), 9:14 AM

Photo 14-6 Discharge piping, bracing to wall
12/18/2002 (Wed), 9:14 AM

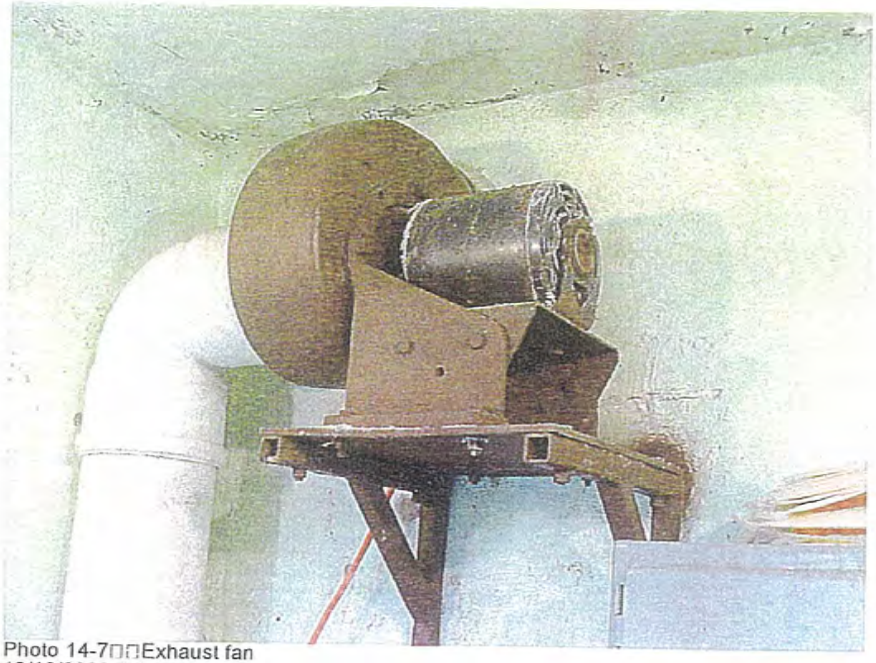


Photo 14-7 Exhaust fan
12/18/2002 (Wed), 9:23 AM

Photo 15-1 Step down into station
MVC-128F.JPG
12/18/2002 (Wed), 10:40 AM

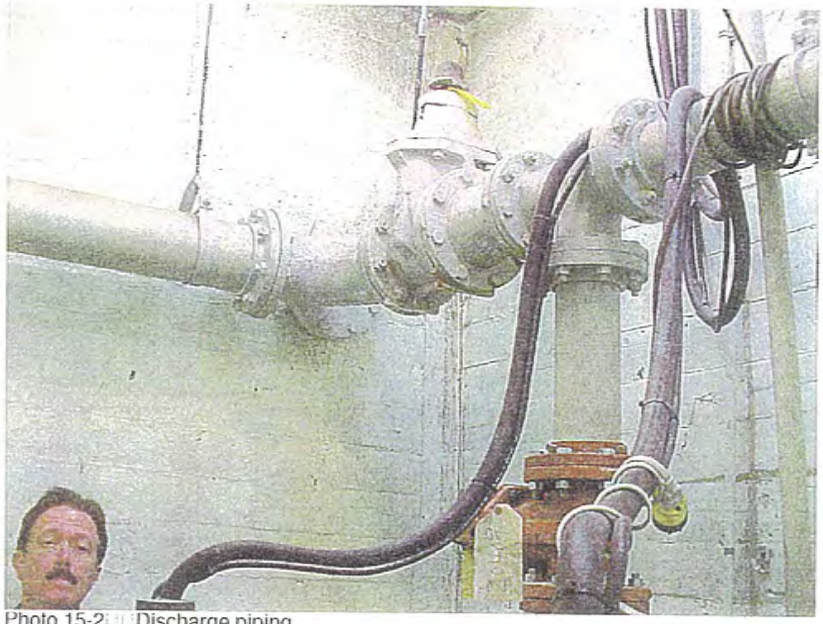


Photo 15-2 Discharge piping
MVC-129F.JPG
12/18/2002 (Wed), 10:44 AM

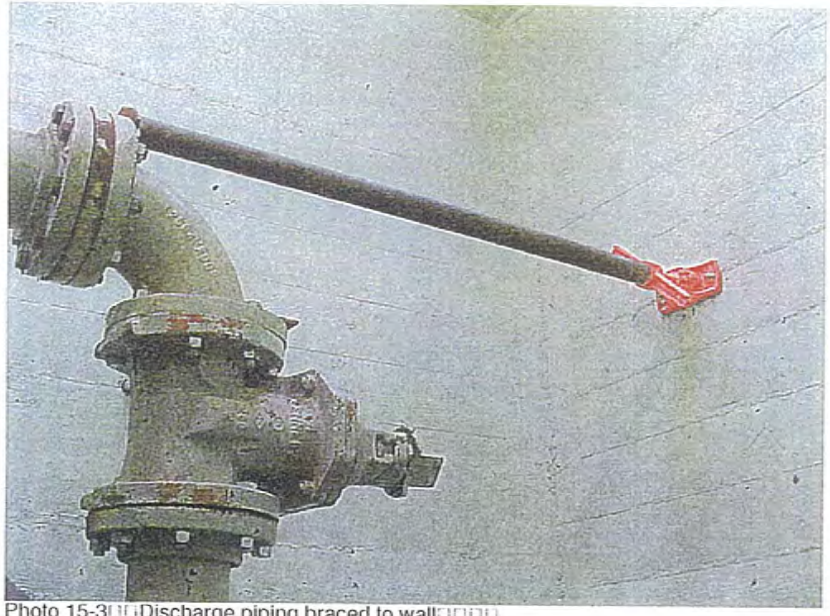


Photo 15-3 Discharge piping braced to wall
MVC-130F.JPG
12/18/2002 (Wed), 10:46 AM

Photo 15-4 Discharge piping braced to well
MVC-131F.JPG
12/18/2002 (Wed), 10:46 AM

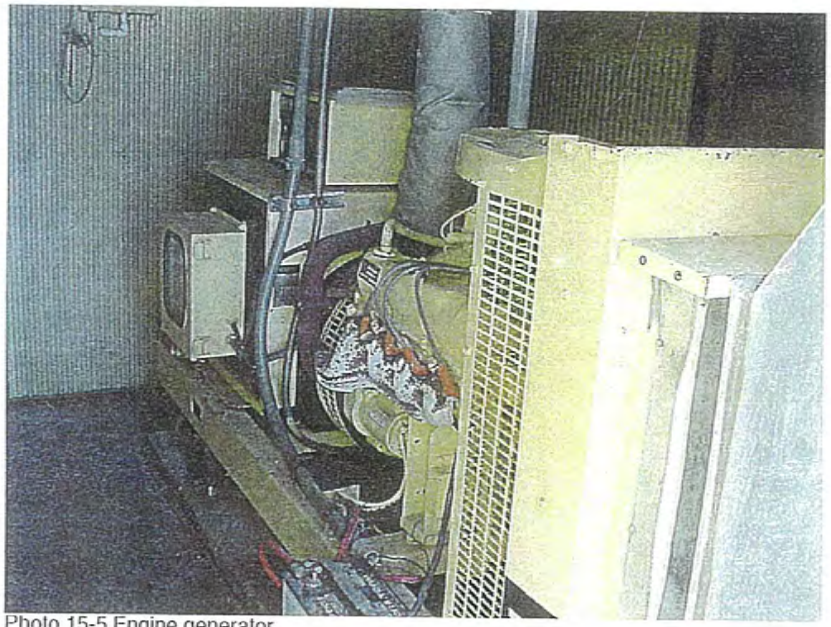


Photo 15-5 Engine generator
MVC-132F.JPG
12/18/2002 (Wed), 10:54 AM

Photo 16-1 Sta. entry is subject to flooding from adjacent property
12/18/2002 (Wed), 10:26 AM

Photo 16-2 Stairway and entry. Electrical panel and station are subject flooding
12/18/2002 (Wed), 10:26 AM

Photo 16-3 Discharge piping
12/18/2002 (Wed), 10:27 AM

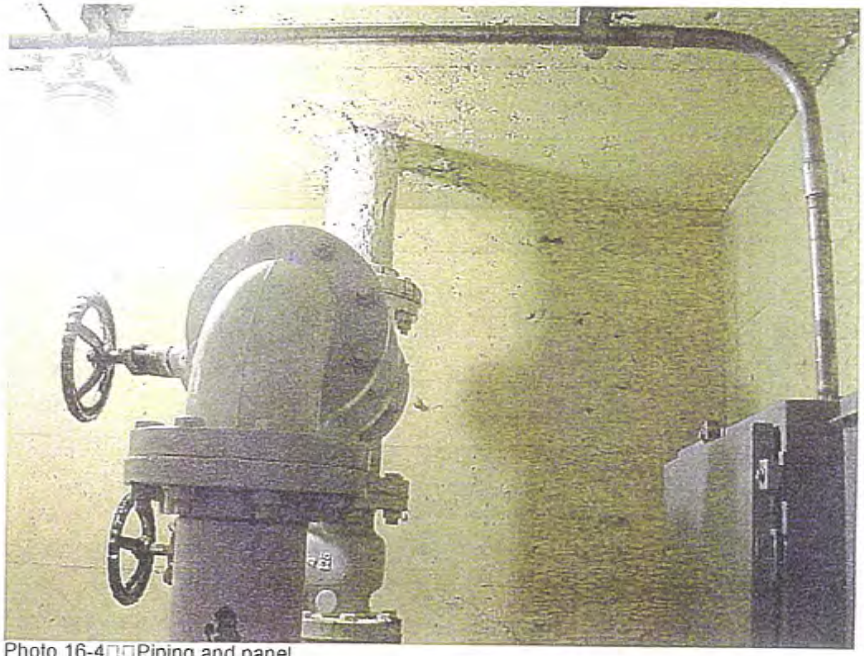


Photo 16-4 Piping and panel
12/18/2002 (Wed), 10:27 AM

Photo 17-1□□Pump control panel
12/18/2002 (Wed), 9:50 AM

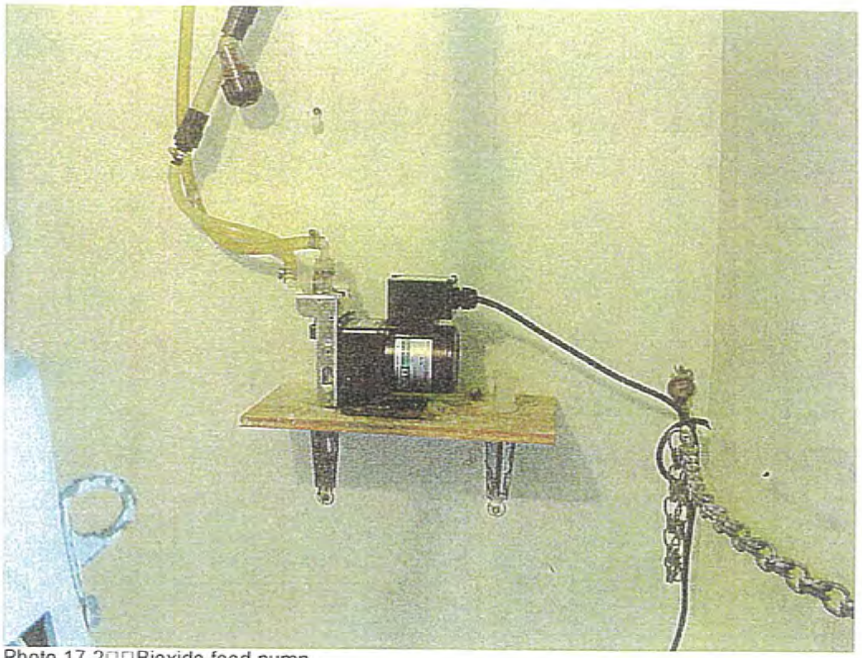


Photo 17-2□□Bioxide feed pump
12/18/2002 (Wed), 9:50 AM

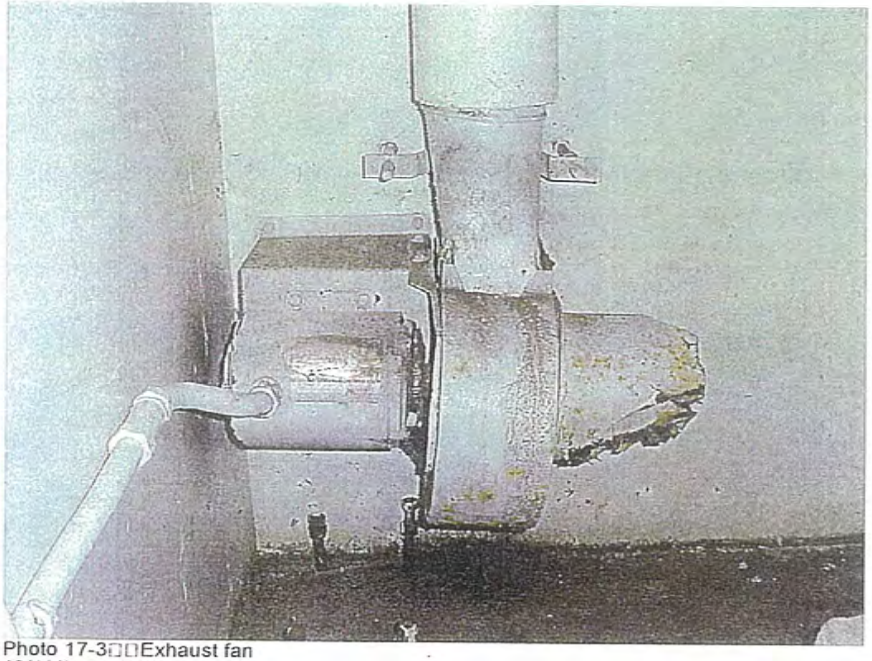


Photo 17-3□□Exhaust fan
12/18/2002 (Wed), 9:54 AM

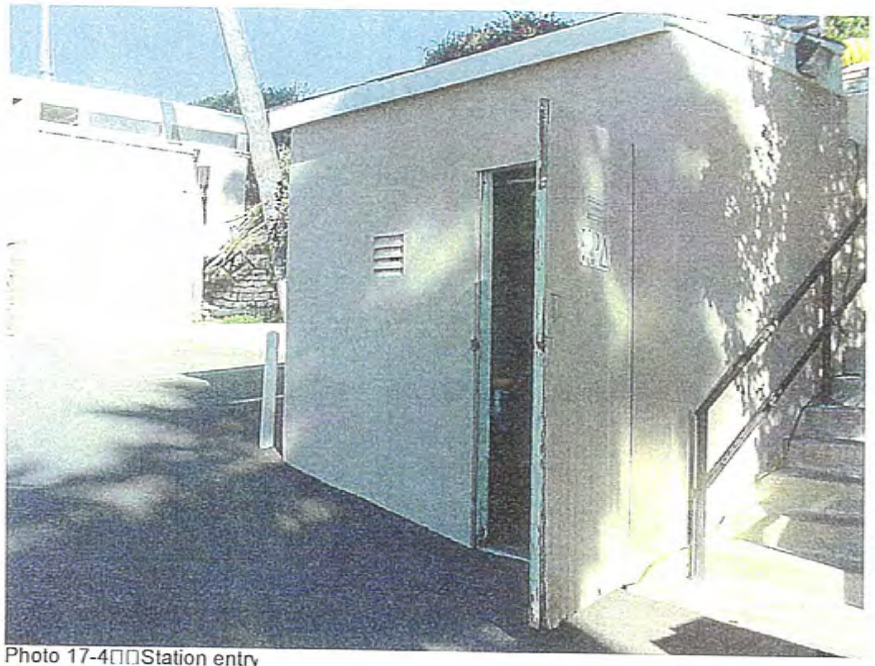


Photo 17-4□□Station entry
12/18/2002 (Wed), 9:45 AM

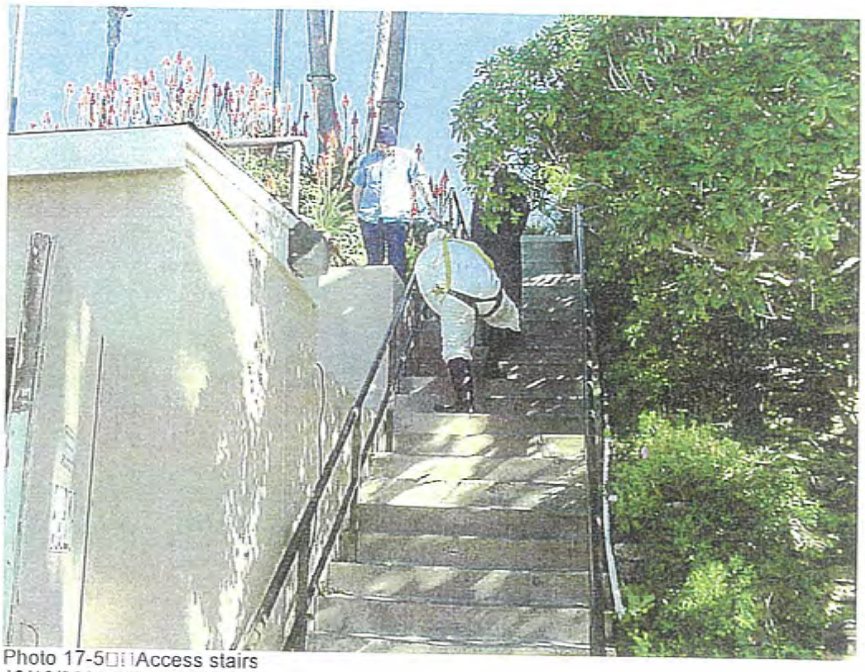


Photo 17-5□□Access stairs
12/18/2002 (Wed), 9:46 AM

Photo 17-6□□Bioxide storage tank
12/18/2002 (Wed), 9:47 AM

Photo 17-7□□Pump and piping
12/18/2002 (Wed), 9:47 AM

19-1 ELECTRICAL PANEL & LIFT STATION ON LEFT WET WELL ON RIGHT
12/24/2002 (Tue), 12:18 PM

PHOTO 19-2 ELECTRICAL PANEL
12/24/2002 (Tue), 12:04 PM

PHOTO 19-3 WET WELL IS UNDER FLAGSTONE PATIC
12/24/2002 (Tue), 11:50 AM

PHOTO 19-4 LIFT STATION ENTRANCE
12/24/2002 (Tue), 11:53 AM

PHOTO 19-5 WET WELL ENTRANCE
12/24/2002 (Tue), 11:54 AM

PHOTO 19-6 PUMP AND DISCHARGE LINE
12/24/2002 (Tue), 12:12 PM

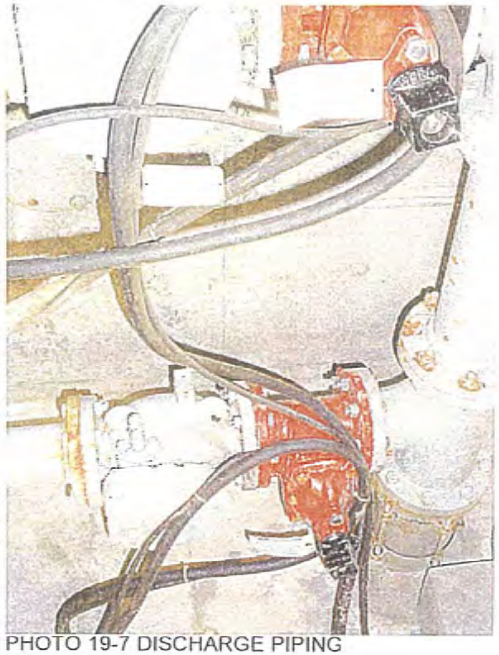


PHOTO 19-7 DISCHARGE PIPING
12/24/2002 (Tue), 12:13 PM

PHOTO 19-8 SUMP
12/24/2002 (Tue), 12:16 PM

PHOTO 19-9 VIEW FROM LIFT STATION TO STREET BELOW
12/24/2002 (Tue), 11:58 AM

PHOTO 20-1
12/24/2002 (Tue), 1:06 PM

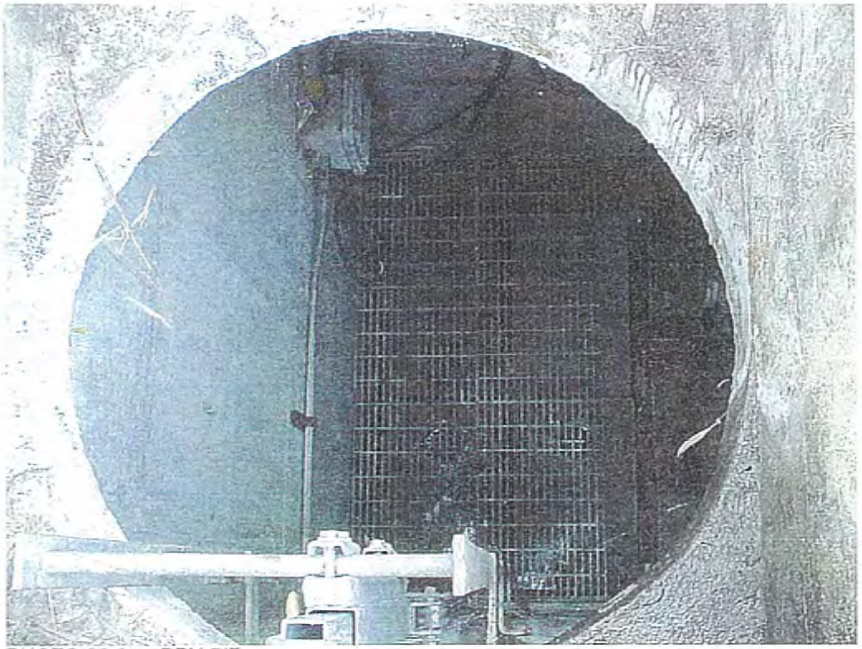


PHOTO 20-2 DRY PIT
12/24/2002 (Tue), 1:10 PM

PHOTO 21-1 Exterior
DSC00050.JPG
12/24/2002 (Tue), 12:33 PM

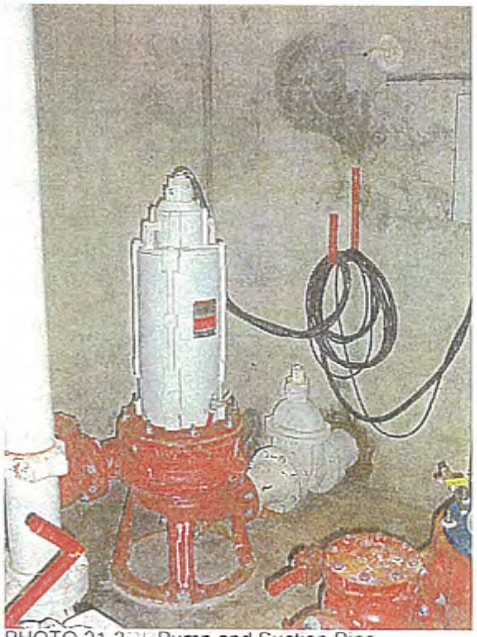


PHOTO 21-2 Pump and Suction Pipe
DSC00051.JPG
12/24/2002 (Tue), 12:34 PM

PHOTO 21-3 DISCHARGE LINE
DSC00052.JPG
12/24/2002 (Tue), 12:41 PM

PHOTO 22-1 PLATES OVER WET WELLS
DSC00001a50.JPG
12/24/2002 (Tue), 10:58 AM

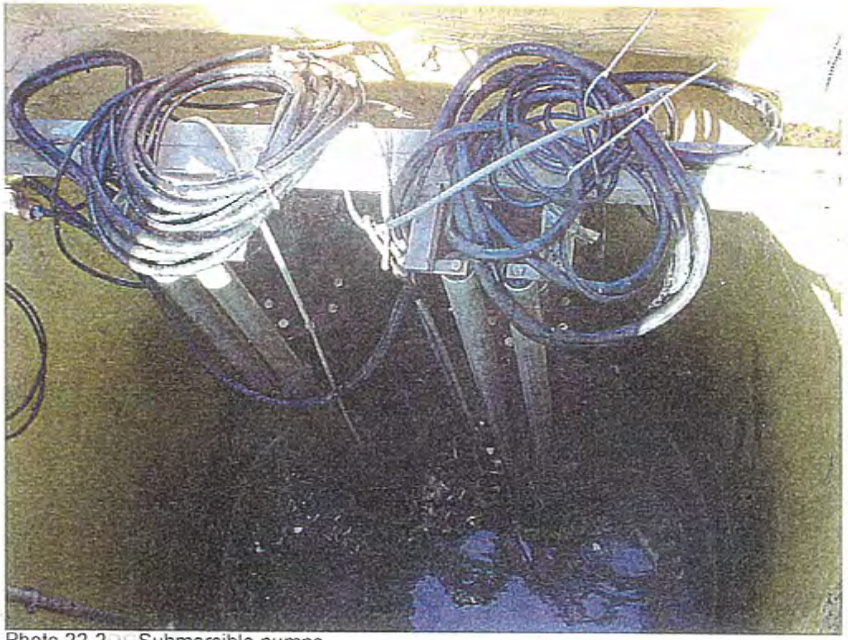


Photo 22-2 Submersible pumps
DSC00001a60.JPG
12/24/2002 (Tue), 11:03 AM

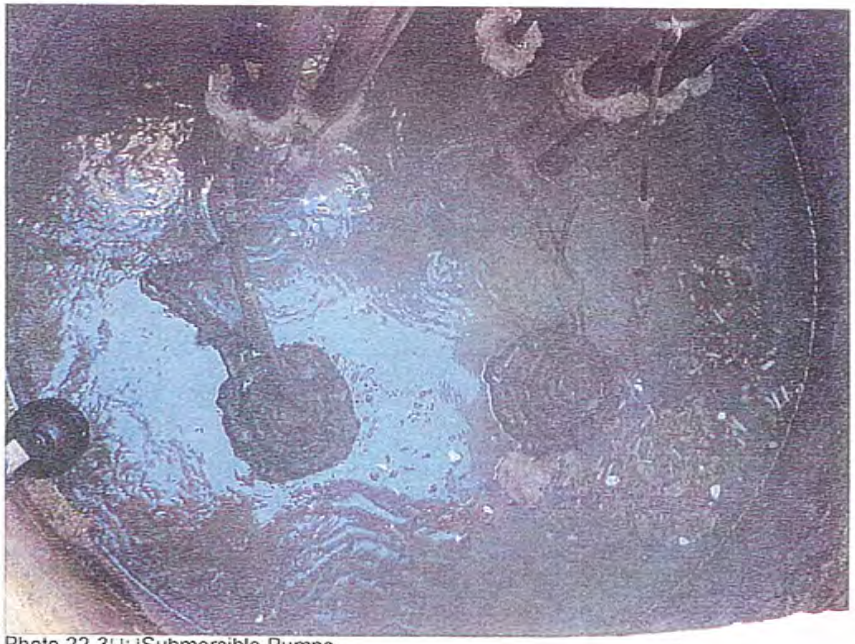


Photo 22-3 Submersible Pumps
DSC00001a70.JPG
12/24/2002 (Tue), 11:09 AM

Photo 22-4 Generator Bldg.
DSC00001a80.JPG
12/24/2002 (Tue), 10:57 AM

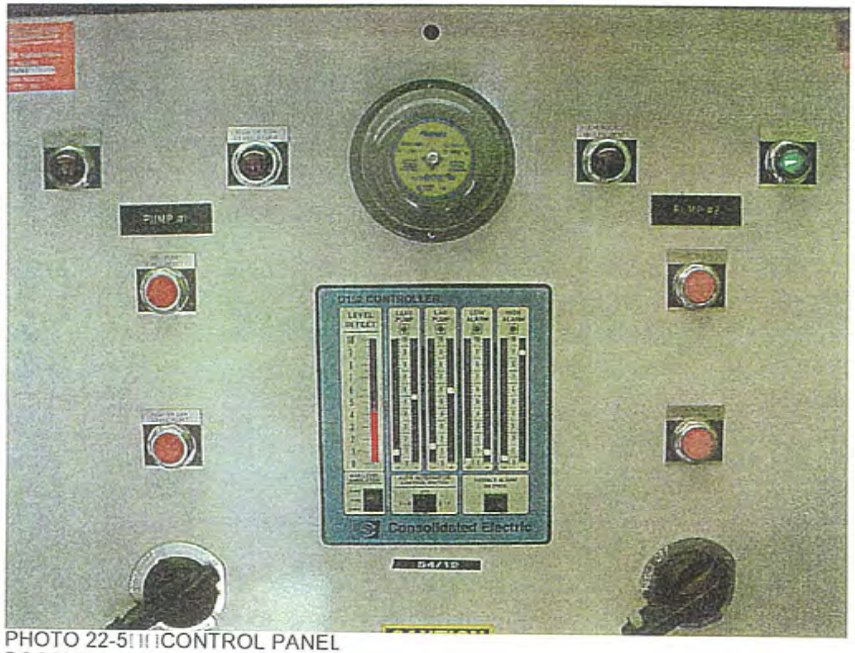


PHOTO 22-5 CONTROL PANEL
DSC00024.JPG
12/24/2002 (Tue), 11:00 AM

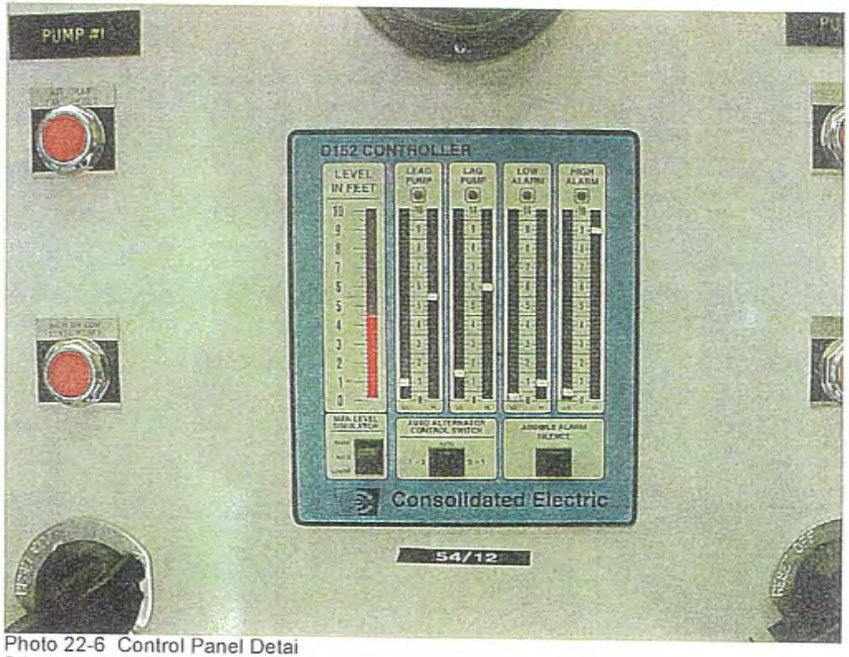


Photo 22-6 Control Panel Detai
DSC00240.JPG
12/24/2002 (Tue), 11:00 AM

Photo 22-7 Engine-Generator
DSC00024a.JPG
12/24/2002 (Tue), 11:03 AM

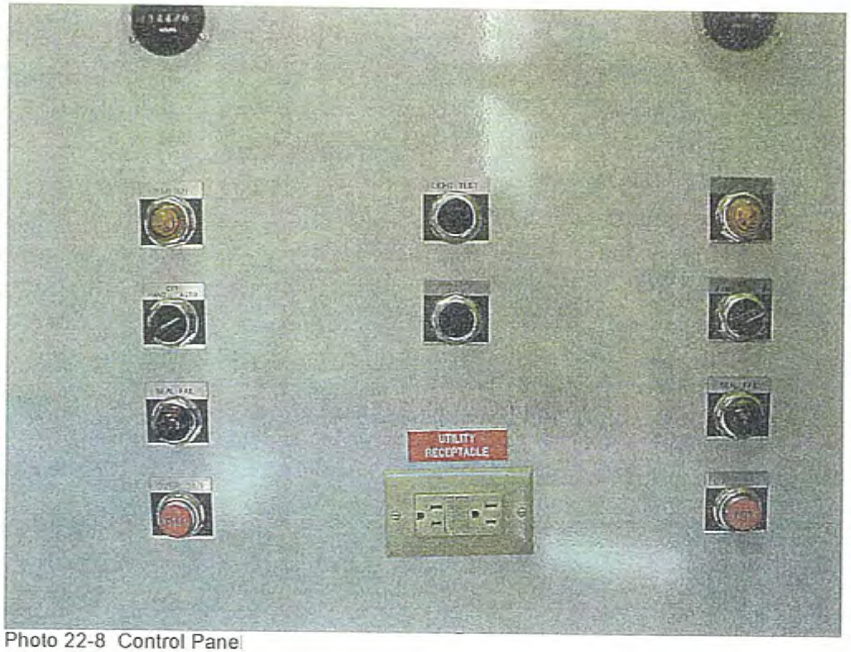


Photo 22-8 Control Panel
DSC00024a15.JPG
12/24/2002 (Tue), 11:00 AM

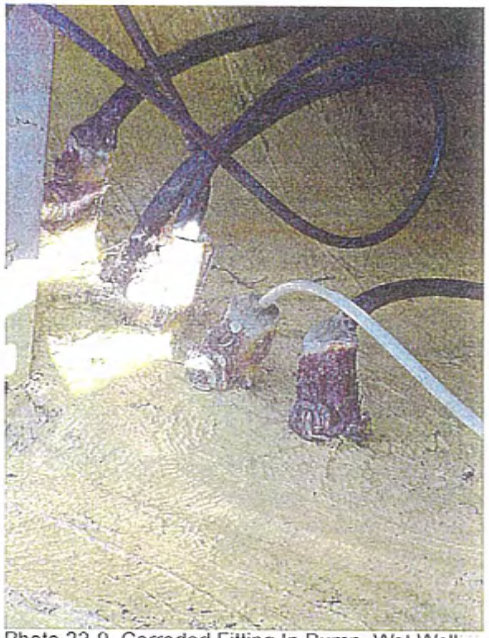


Photo 22-9 Corroded Fitting In Pump Wet Well
DSC00024a20.JPG
12/24/2002 (Tue), 11:09 AM

PHOTO 23-1 OUTSIDE LIFT STATION
DSC00031.JPG
12/24/2002 (Tue), 11:29 AM

Photo 23-2 Engr Generator Unit in Vaul
DSC00031a.JPG
12/24/2002 (Tue), 11:32 AM

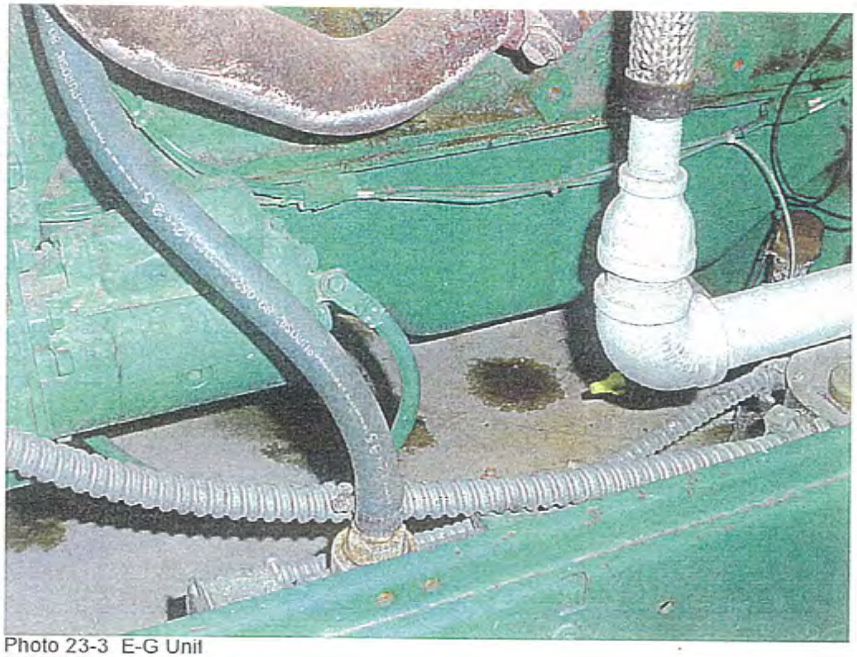


Photo 23-3 E-G Unit
DSC00031a10.JPG
12/24/2002 (Tue), 11:36 AM

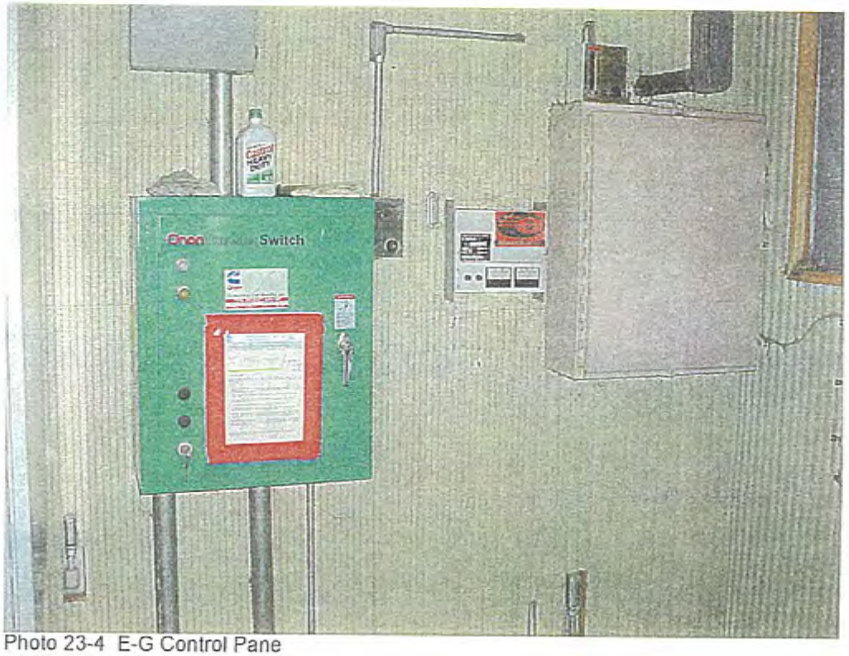


Photo 23-4 E-G Control Pane
DSC00032.JPG
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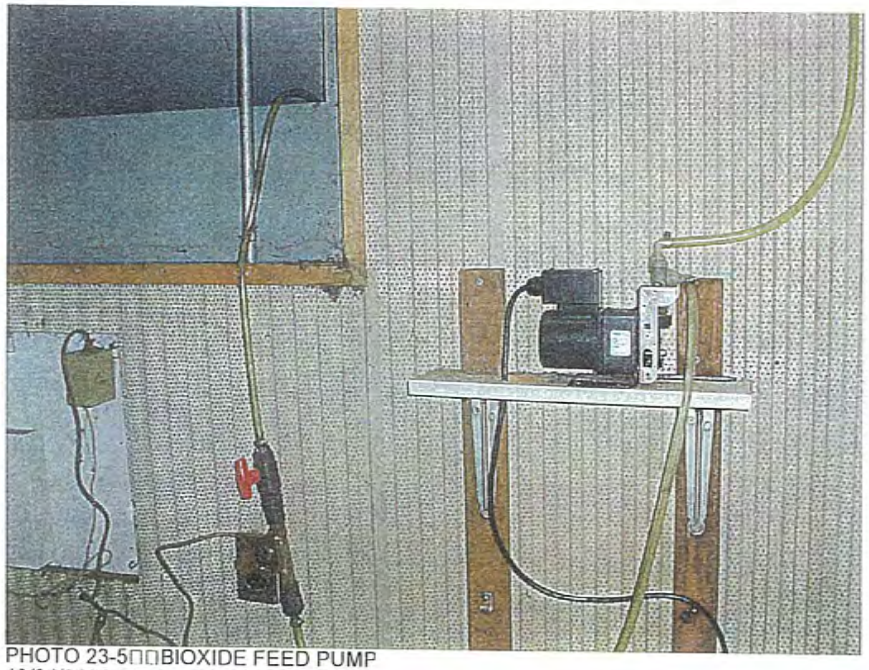


PHOTO 23-5□□BIOXIDE FEED PUMP
12/24/2002 (Tue), 11:37 AM

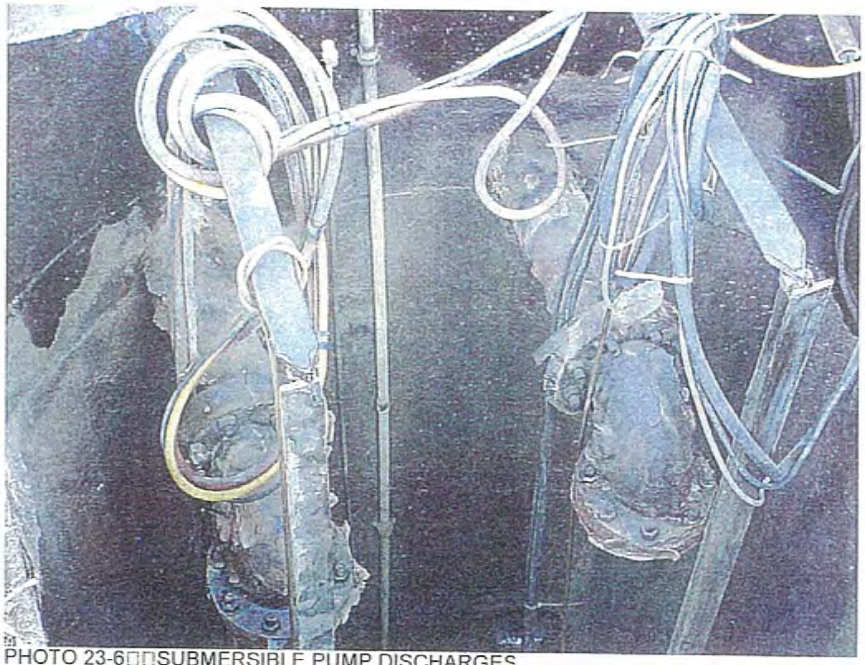


PHOTO 23-6□□SUBMERSIBLE PUMP DISCHARGES
12/24/2002 (Tue), 11:43 AM

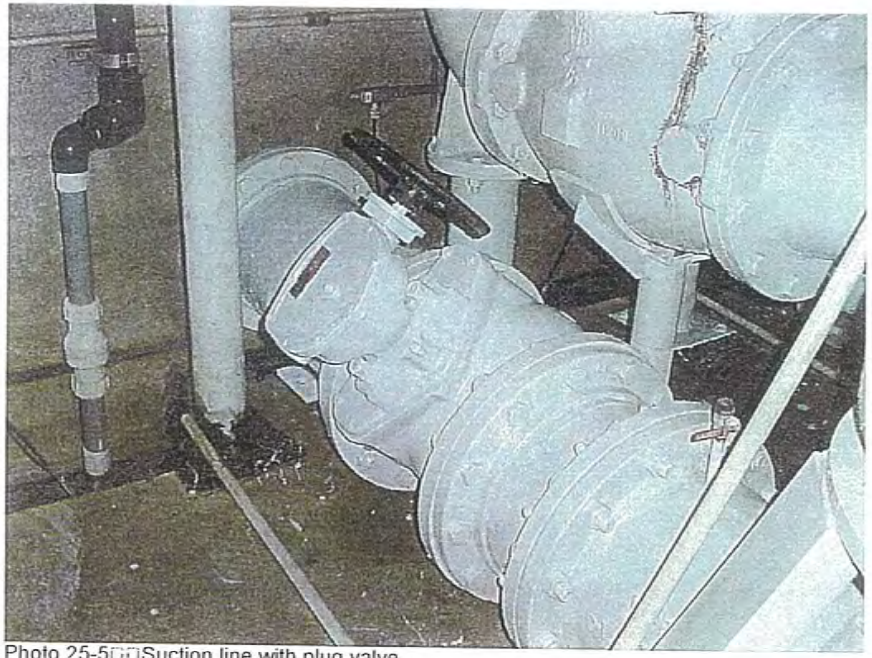


Photo 25-5□□Suction line with plug valve
12/12/2002 (Thu), 9:22 AM

Photo 25-6□□□Pump suction & discharge piping
12/12/2002 (Thu), 9:23 AM

Photo 25-7□□□RW gate valves in discharge lines
12/12/2002 (Thu), 9:44 AM

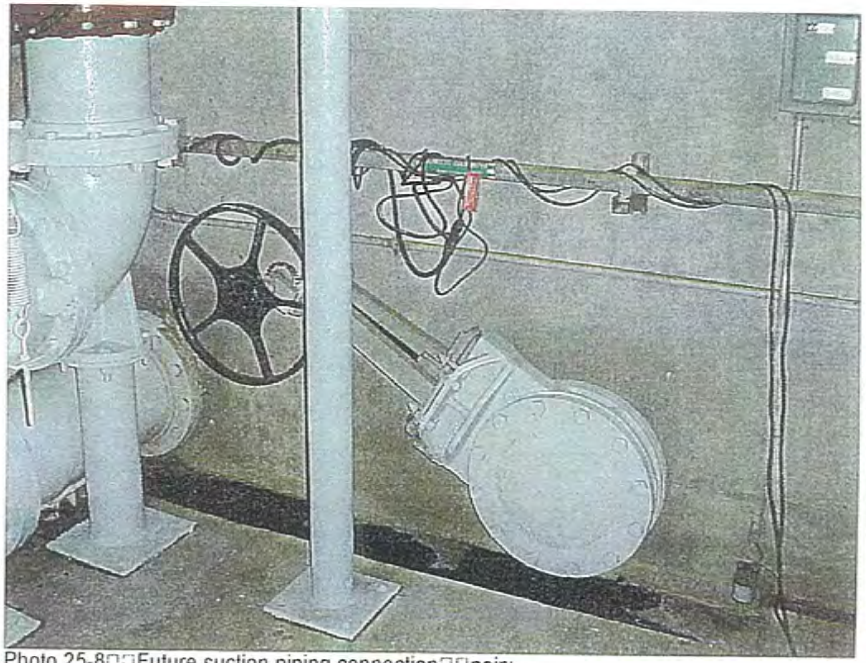


Photo 25-8□□Future suction piping connection□□poin
12/12/2002 (Thu), 9:44 AM

Photo 25-9□□Sump pump
12/12/2002 (Thu), 9:44 AM

Photo 25-10□□Surge tank & connection to discharge pipe
12/12/2002 (Thu), 9:47 AM

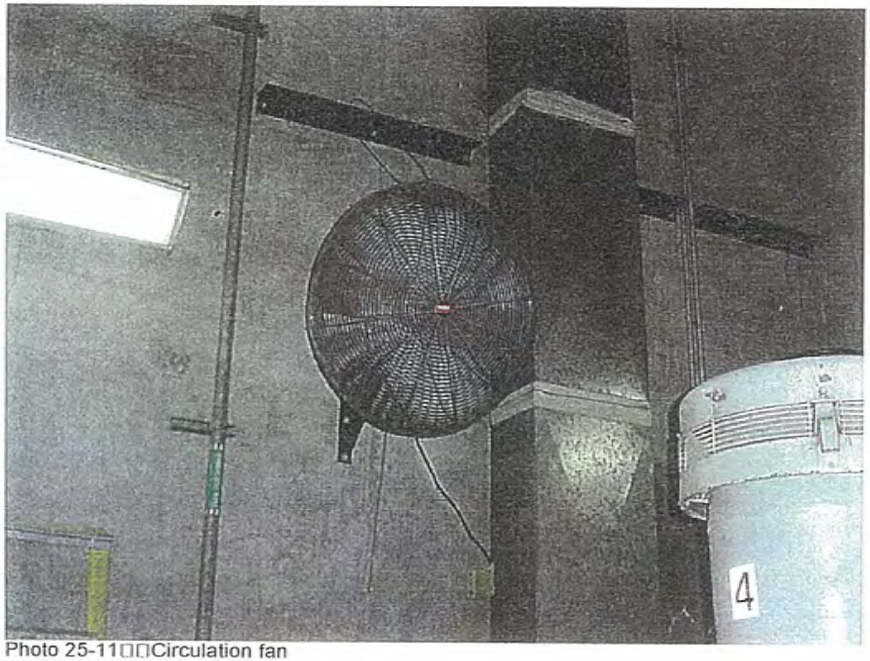


Photo 25-11□□Circulation fan
12/12/2002 (Thu), 9:49 AM

Photo 25-12 - Hoist and trolley
12/12/2002 (Thu), 9:56 AM

Photo 25-13 Pump- Control panel
MVC-084F.JPG
12/12/2002 (Thu), 10:03 AM

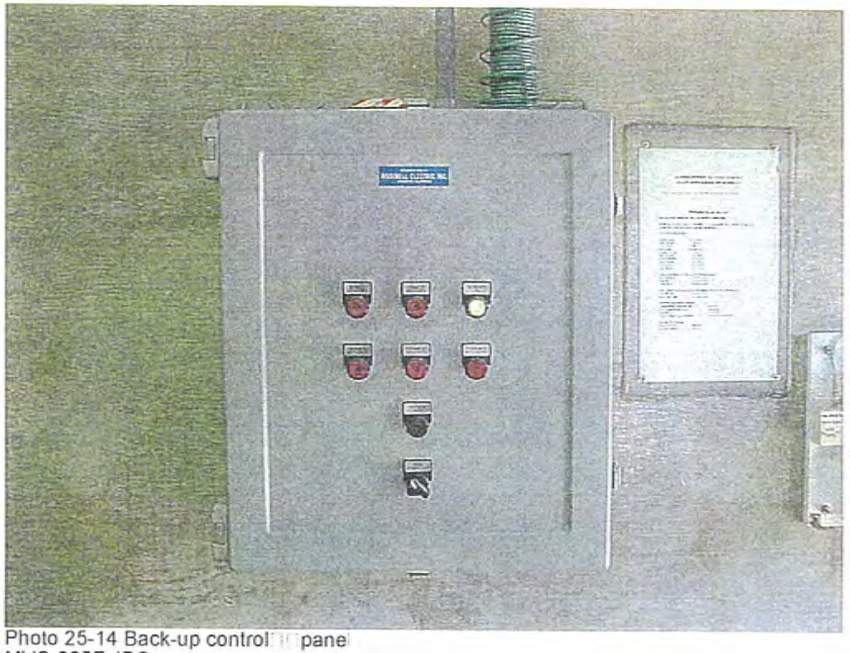


Photo 25-14 Back-up control panel
MVC-085F.JPG
12/12/2002 (Thu), 10:03 AM

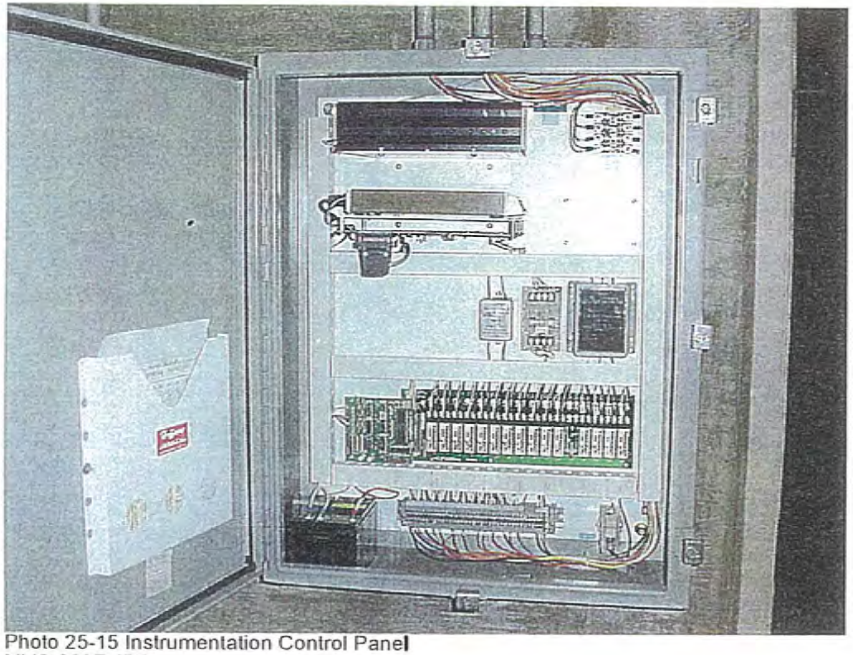


Photo 25-15 Instrumentation Control Panel
MVC-086F.JPG
12/12/2002 (Thu), 10:03 AM

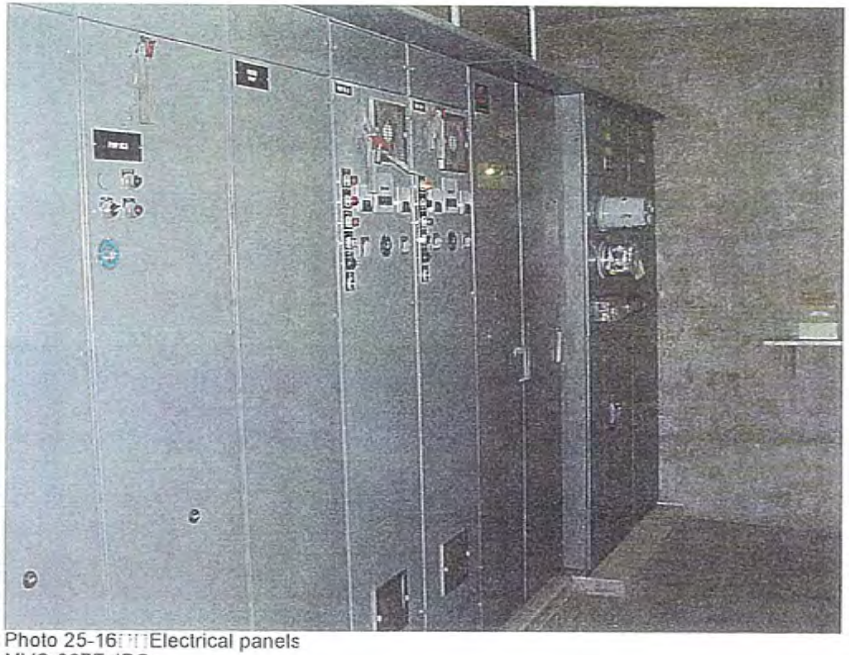


Photo 25-16 Electrical panels
MVC-087F.JPG
12/12/2002 (Thu), 10:04 AM

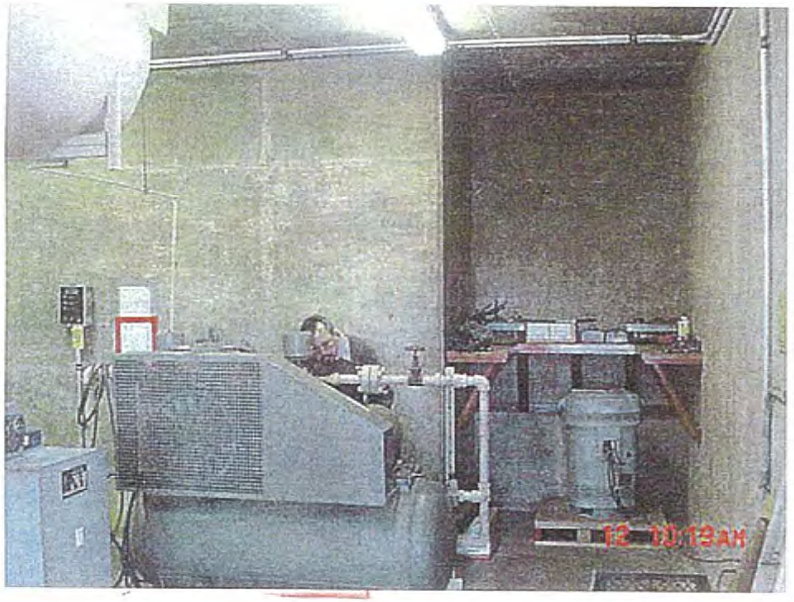


Photo 25-17 Engine Generator
LagunaBeach1.jpg
12/12/2002 (Thu), 1:42 PM

Photo 25-18 Stairway
LagunaBeach2.jpg
12/12/2002 (Thu), 1:43 PM

Photo 25-19 Pump Room
LagunaBeach3.jpg
12/17/2002 (Tue), 10:11 AM

Photo 25-20 Pump Roof Slab
LagunaBeach4.jpg
12/12/2002 (Thu), 1:43 PM

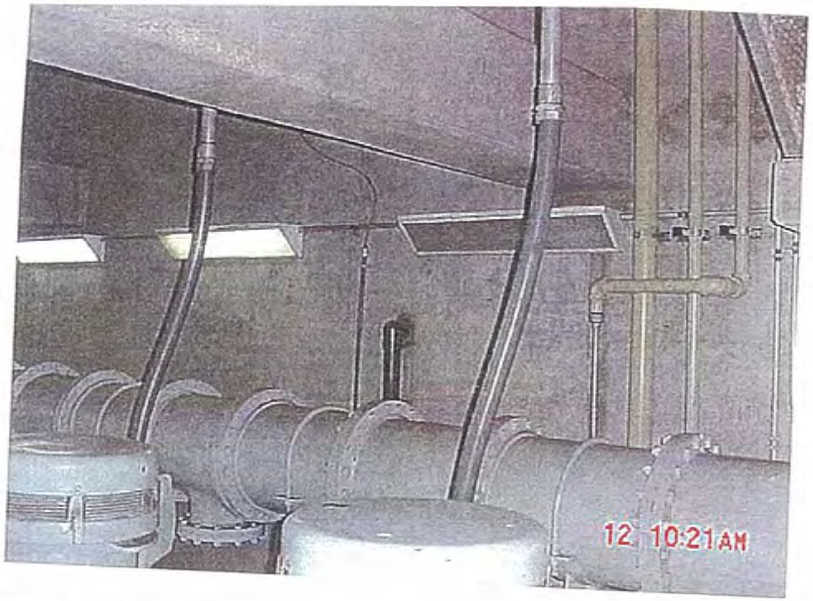


Photo 25-21 Discharge Header
LagunaBeach5.jpg
12/12/2002 (Thu), 1:44 PM

Photo 25-22 Pump Room Floor
LagunaBeach6.jpg
12/12/2002 (Thu), 1:44 PM

Photo 25-23 Outside of Lift Statior
LagunaBeach7.jpg
12/12/2002 (Thu), 1:44 PM

Photo 25-24 WET WELL INFLOW
LagunaBeachLiftStationInlet.jpg
12/12/2002 (Thu), 1:09 PM

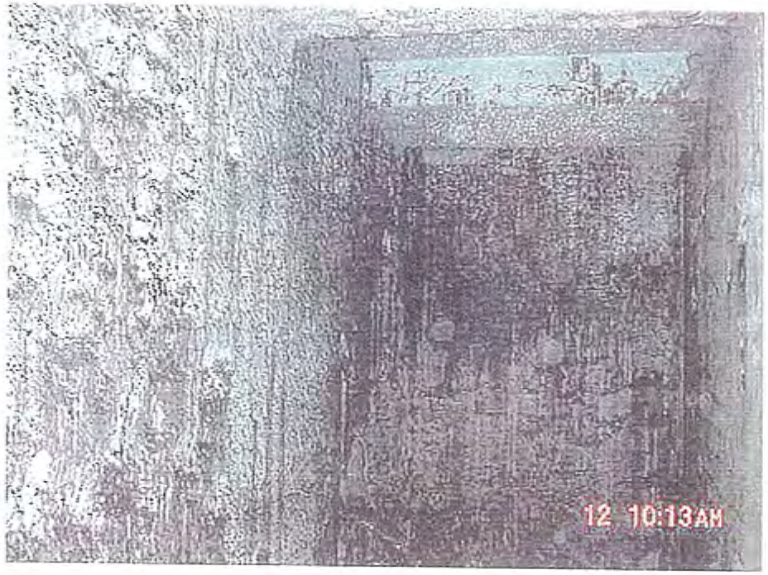


Photo 25-28 Wall Wet Well
LagunaBeachLiftStationWall1.jpg
12/17/2002 (Tue), 10:08 AM

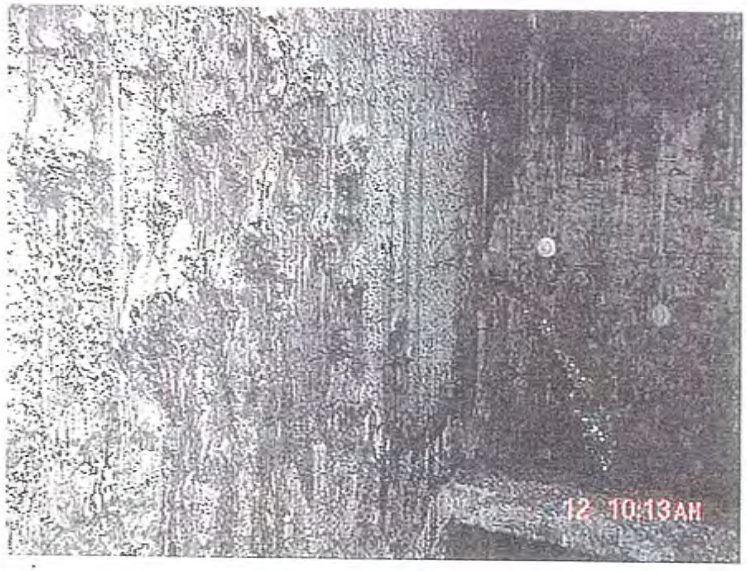


Photo 25-29 Wet Wall Well
LagunaBeachLiftStationWall2.jpg
12/31/2002 (Tue), 2:32 PM

Photo 25-30 Wall Corner Wet Well
LagunaBeachLiftStationWall3.jpg
12/12/2002 (Thu), 1:07 PM

Photo 25-31 Wall Wet Well
LagunaBeachLiftStationWall4.jpg
12/12/2002 (Thu), 1:31 PM

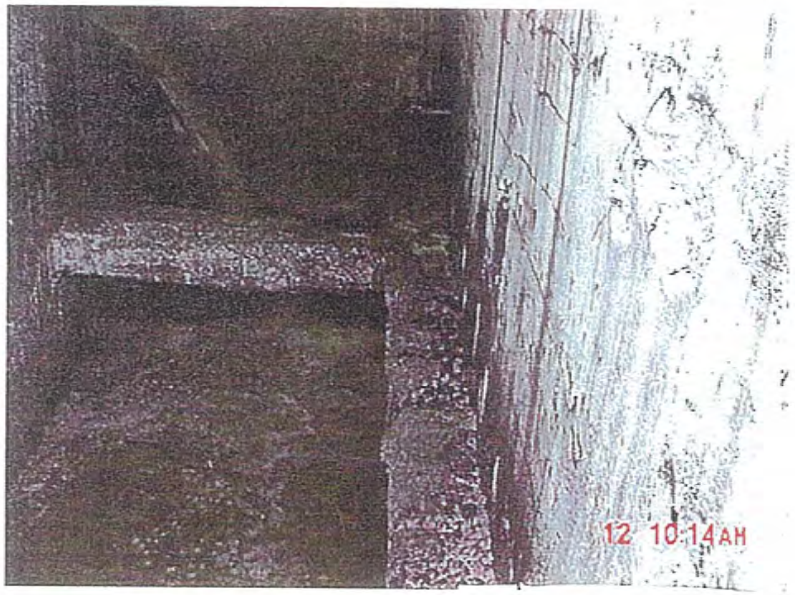


Photo 25-32 Wet Well Water Surface and Wall Beam
LagunaBeachLiftStationWallBeam.jpg
12/12/2002 (Thu), 1:32 PM

Photo 26-1 ENTRANCE FROM STREET
MVC-088F.JPG
12/12/2002 (Thu), 10:27 AM

Photo 26-2 ENTRANCE FROM STREET
MVC-089F.JPG
12/12/2002 (Thu), 10:28 AM

Photo 26-3 ENTRANCE FROM STREET
MVC-090F.JPG
12/12/2002 (Thu), 10:29 AM

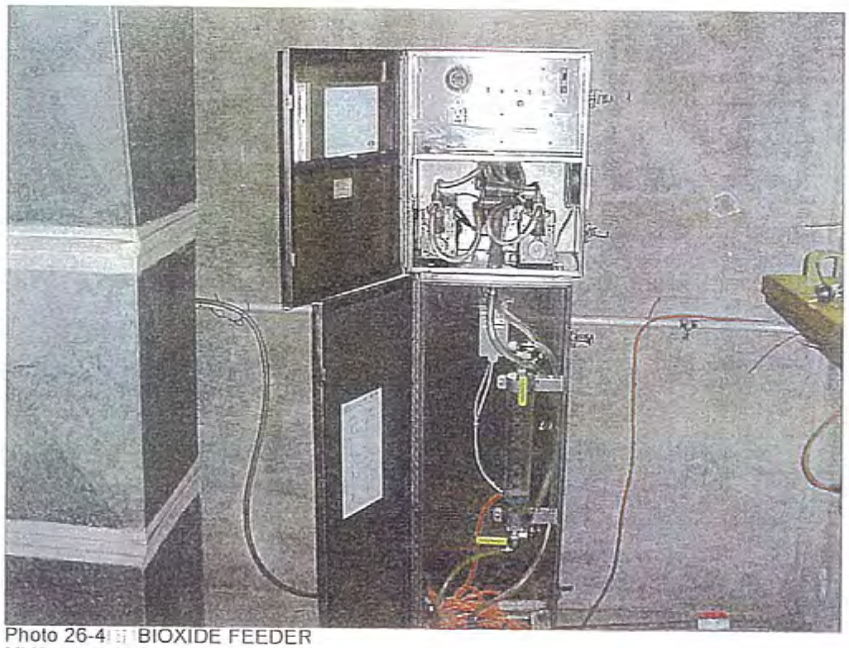


Photo 26-4 BIOXIDE FEEDER
MVC-091F.JPG
12/12/2002 (Thu), 10:35 AM

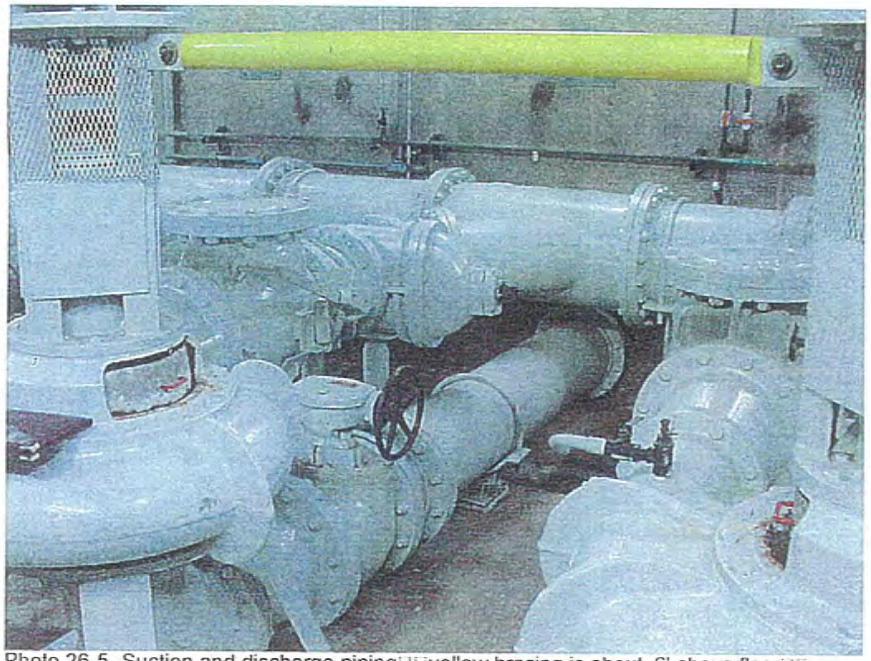


Photo 26-5 -Suction and discharge piping yellow bracing is about 6' above floor
12/12/2002 (Thu), 10:47 AM

Photo 26-6 - Sewage pump
12/12/2002 (Thu), 10:48 AM

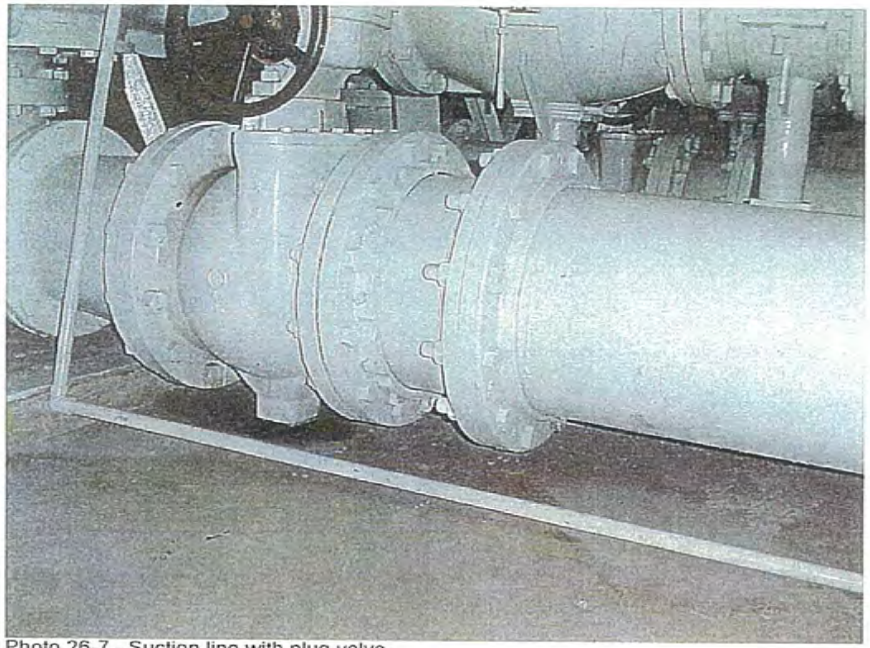


Photo 26-7 - Suction line with plug valve
12/12/2002 (Thu), 10:49 AM

Photo 26-8 - Check valve with limit switch Typical for for each variable - speed pump
12/12/2002 (Thu), 10:50 AM

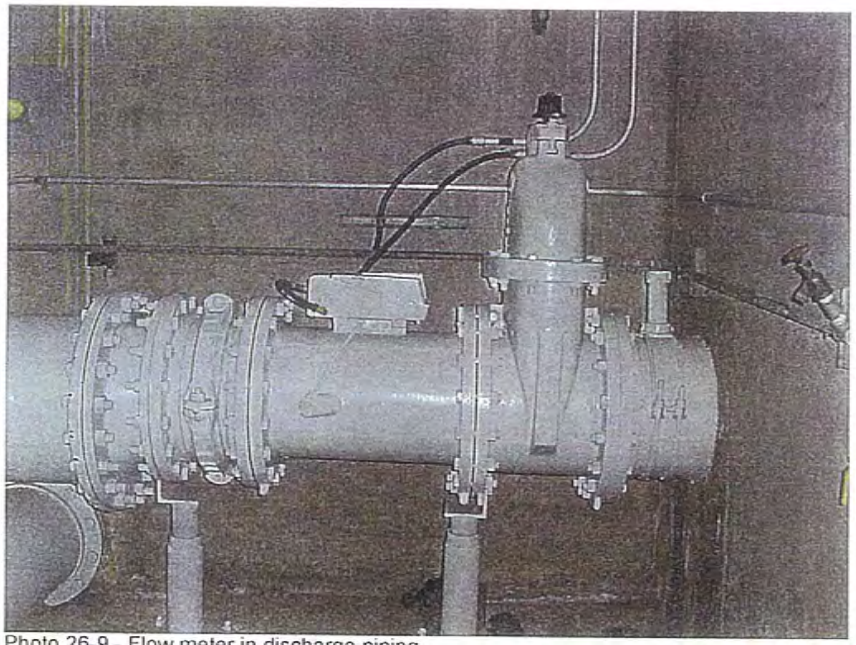


Photo 26-9 - Flow meter in discharge piping
MVC-096F.JPG
12/12/2002 (Thu), 11:00 AM

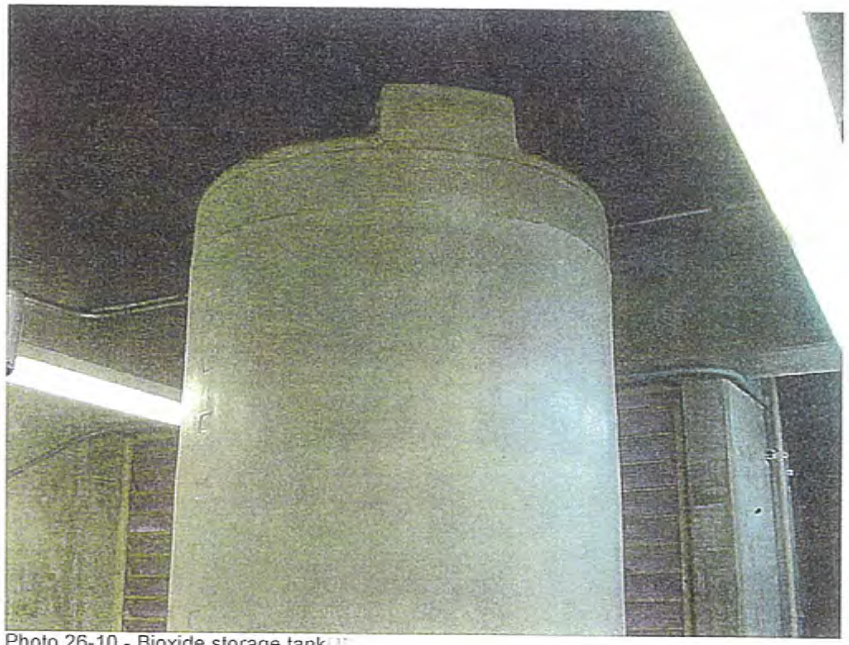


Photo 26-10 - Bioxide storage tank
MVC-097F.JPG
12/12/2002 (Thu), 11:04 AM

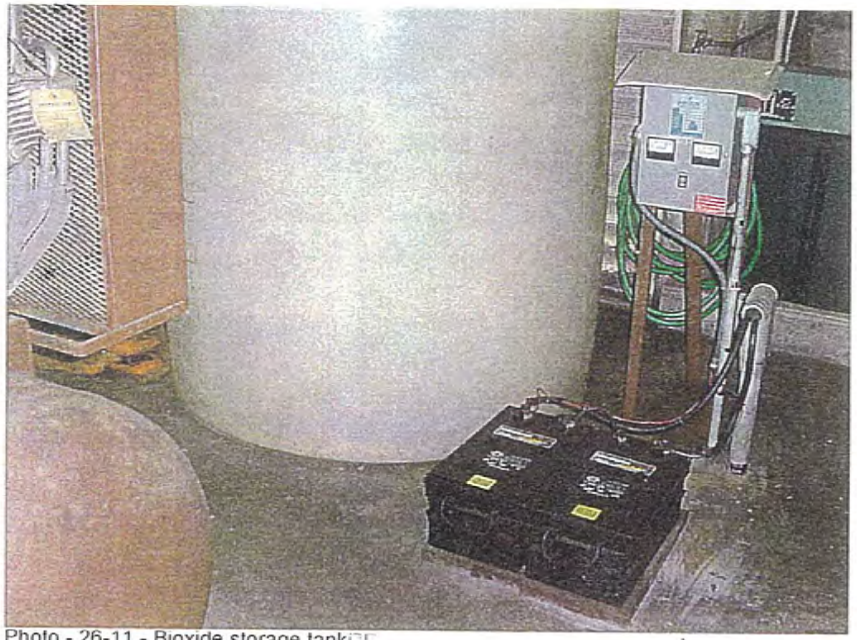


Photo - 26-11 - Bioxide storage tank
MVC-098F.JPG
12/12/2002 (Thu), 11:04 AM

Photo 26-12
Copy of Bluebird1.jpg
12/12/2002 (Thu), 1:37 PM

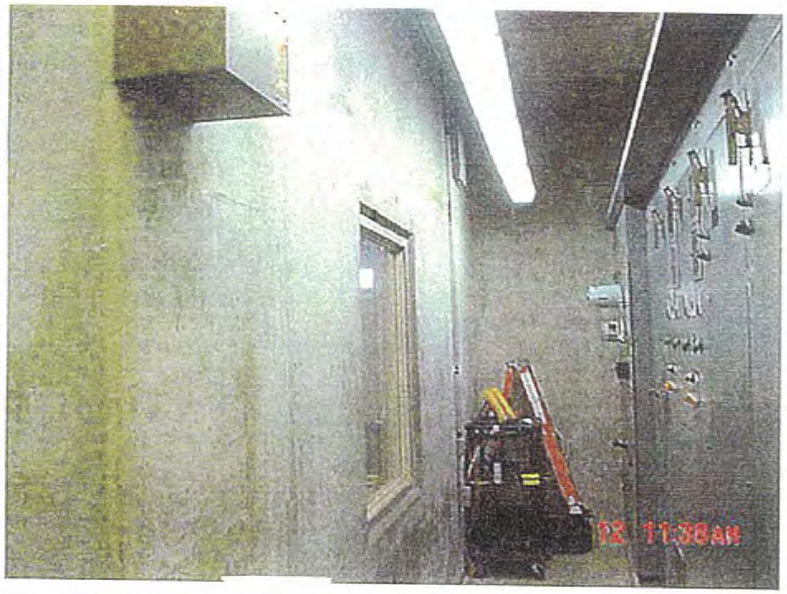


Photo 26-13 Interior Concrete and Electrical Panels
Bluebird2.jpg
12/12/2002 (Thu), 1:38 PM

Photo 26-14 Interior Concrete Walls/Roof Slab
Bluebird3.jpg
12/12/2002 (Thu), 1:38 PM

Photo 26-15 Pump Room
Bluebird4.jpg
12/12/2002 (Thu), 1:39 PM

Photo 26-16
Bluebird5.jpg
12/12/2002 (Thu), 1:39 PM

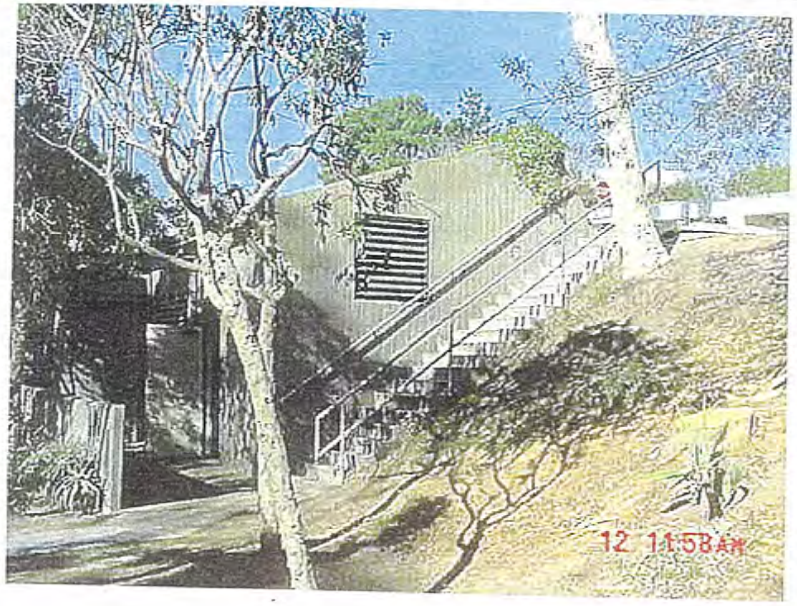


Photo 26-17 Station exterior
Bluebird6.jpg
12/12/2002 (Thu), 1:40 PM

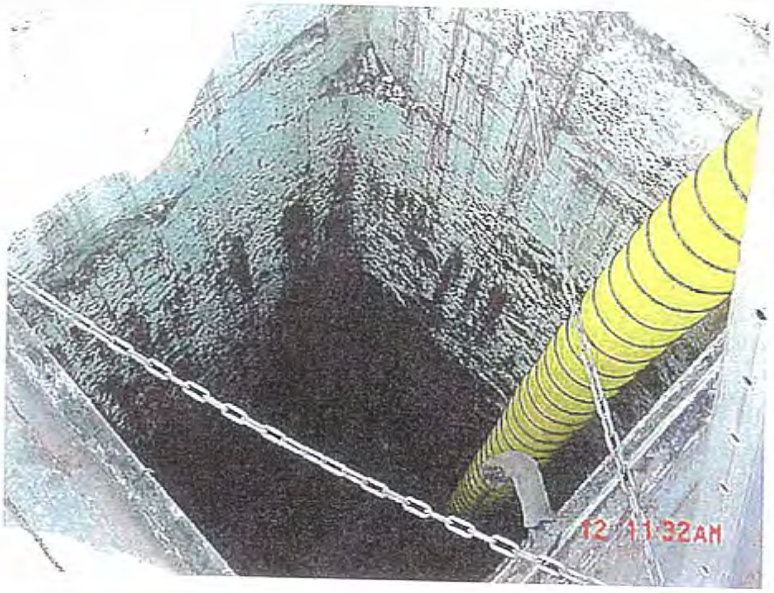


Photo 26-18 Wet well manhole shaft
BluebirdManhole1.jpg
12/12/2002 (Thu), 1:36 PM

Photo 26-19 Wet well manhole shaft
BluebirdManhole2.jpg
12/12/2002 (Thu), 1:36 PM

Appendix C

APPENDIX C
WASTEWATER HAZARDOUS AREA CLASSIFICATION

Introduction

For sewage pump stations, the classification of various areas with respect to explosive vapors is an important design consideration. Wastewater-related fire and explosion incidents are infrequent but are relatively severe when they do occur.

Hazardous area classification affects many parts of wastewater-related designs, from the structure to the ventilation to the electrical equipment. Following is a review of project hazardous area classifications.

Hazardous Classifications: Classes, Groups, and Divisions

The National Electrical Code (NEC) divides or defines hazardous areas by a combination of three descriptors: ***Classes***, ***Groups***, and ***Divisions***.

CLASSES: Hazardous areas or atmospheres are defined as follows:

> **Class I:** Areas in which flammable gases or vapors may be present in the air in sufficient quantities to be explosive.
>
> **Class II:** Areas made hazardous by the presence of combustible dust.
>
> **Class III:** Areas made hazardous by the presence of easily ignitable fibers or dust, but which are not likely to be in suspension in the air in quantities that are sufficient to ignite.

Groups: In addition, various *groups* are defined as:

<u>CLASS I:</u>

Group A: Atmospheres containing acetylene.

Group B: Atmospheres such as butadiene, ethylene oxide, propylene oxide, acrolein, or hydrogen (or gases or vapors equivalent in hazard to hydrogen, such as manufactured gas).

Group C: Atmospheres such as cyclopropane, ethyl ether, ethylene, or gas or vapors, or equivalent hazard.

Group D: Atmospheres such as acetone, ammonia, benzene, butane, cyclopropane, ethanol, gasoline, hexane, methanol, methane, natural gas, naphtha, propane, or gases or vapors, or equivalent hazard.

CLASS II

Group E: Atmospheres containing combustible:

1) metal dusts, regardless of resistivity;

2) dust of similarly hazardous characteristics having a resistivity less than 100 kΩ -cm;

3) electrically conductive dusts.

Group F: Atmospheres containing combustible:

1) carbon black, charcoal, or coke dusts having more than 8% total volatile material;

2) dusts so sensitized that they present an explosion hazard, and dusts having a resistivity greater than 100 □ -cm but less than or equal to 1 x 10^8 Ω -cm.

Group G: Atmospheres containing combustible:

1) dust having resistivity equal to or greater than 100 kΩ -cm;

2) electrically nonconductive dusts.

Divisions: The above areas or classifications are further divided into two *divisions*:

Division 1: Atmospheres where hazardous concentrations exist continuously, intermittently, or periodically under normal operating conditions.

Division 2: Atmospheres where hazardous concentrations exist only in case of accidental rupture or breakdown of equipment, or in the case of abnormal operation of equipment.

Thus, an area is described by a combination of these three descriptors. For example: Class I; Groups A, B, C, D; Division 1.

National Fire Protection Association 820 (NFPA 820), *Fire Protection in Wastewater Treatment and Collection Facilities*, was originally adopted in 1983 as a recommended practice and was upgraded to a standard in 1995. NFPA 820 is a comprehensive standard on wastewater hazardous area classification, ventilation, gas detection, construction materials, fire protection, and administrative controls.

NFPA 820 should be considered a minimum design standard for all wastewater projects. There are other local jurisdictions that may have additional or contradictory requirements such as the one discussed below.

California Title 8

California has a regulation, Title 8, Chapter 4, *Electrical Safety Orders;* Article 59, *Hazardous (Classified) Locations;* Section 2540.10, *Wastewater Wells,* which requires certain protection in dry wells above and beyond NFPA 820. Since a state regulation has the same force as a law, designs must comply with Title 8.

Title 8 has a clause in reference to the requirements to declassify a sewage lift station dry well; it reads:

...The well and surrounding area are provided with a suitable, continuously operating ventilation system to maintain the flammability of the interior atmosphere below 20% of the lower explosive limit (LEL). The air for the ventilation systems shall be supplied from a non-hazardous source. Means shall be provided to automatically de-energize all electrical sources of ignition in the well in the event of ventilation system failure, which would result in the interior atmosphere of the well reading 20% of the lower explosive limit (LEL).

An interpretation of Title 8 is that an electrical room above or beside the dry well with no vapor barrier between rooms is considered part of the dry well.

Dilemma

Words in California Title 8 such as "automatically de-energize" are of concern. Few sanitation districts want to stop a sewage lift station automatically because it could result in a raw wastewater spill.

There are several alternatives that comply with both NFPA 820 and Title 8. The first alternative is to remove the electrical equipment from the dry well or physically isolate the electrical room from the dry well. This allows the dry well to be classified as Class I Division 2 and the electrical room as unclassified.

A second alternative that complies with NFPA 820, and which meets the intent of California Title 8, is to automatically de-energize the electrical power in the pumping station upon *concurrent* combustible gas detection and ventilation failure. A differential pressure switch or a flow switch in the ventilation duct can detect a ventilation failure. A gas detection system in the dry well can detect a combustible gas reading of 20% of LEL. Individually, these conditions can be detected, alarmed via telemetry, and repaired without automatically de-energizing the lift station. The chance of either of these conditions occurring is remote. The chance of both these occurring concurrently, which would require automatically de-energizing the power, is even more remote. Automatically de-energizing the power to the pumping station in this extremely rare situation, is a viable, inexpensive alternative.

A third alternative is to provide electrical equipment in the dry well rated for Class I Division 2.

Responsibilities

The three primary design disciplines that are affected by hazardous area classification are process/civil, mechanical, and electrical. Classifications such as Class I Division 1 and Class I Division 2 are defined in NFPA's National Electric Code (NEC) and have only direct effect on electrical equipment. However, mechanical HVAC equipment, such as fans, must be specified as "spark proof" if they are to be located in hazardous areas. Electrical equipment rated for hazardous areas is very expensive, more difficult to maintain, and should be avoided whenever possible. Sometimes, however, the cost of electrical

equipment rated for hazardous areas is less than the costs required to create a separate, isolated electrical room. Some electrical equipment is not available for hazardous applications, such as motor control centers, variable frequency drives, and utility switchboards.

The following is an excerpt from Table 2 of NFPA 820 that describes the requirements for a below-grade sewage lift station:

Location and Function	**Fire and Explosion Hazard**	**Ventilation**	**Extent of Classified Area**	**NEC-Area Electrical Classification (All Class I, Group D)**	**Fire Protection Measures**
Wastewater Pumping Station Wet Wells. Liquid side of a pumping station serving a sanitary sewer or combined system.	Possible ignition of flammable gases and floating flammable liquid.	A ——— B	Entire room or space	Division 1 ——— Division 2	CGD
Below or Partially Below-Grade Wastewater Pumping Station Dry Well. Pump room physically separated from wet well. Pumping of wastewater from a sanitary or combined sewer system through closed pumps and pipes.	Buildup of vapors from flammable or combustible liquids.	C ——— D	Entire room or space	Unclassified ——— Division 2, or unclassified, if space provided with pressurization in accordance with NFPA 496.	FE

A: No ventilation or ventilated at less than 12 air changes per hour.
B: Continuously ventilated at 12 air changes per hour or in accordance with Chapter 7.
C: Continuously ventilated at six air changes per hour or in accordance with Chapter 7.
CGD: Combustible gas detection system.
D: No ventilation or ventilated at less than six air changes per hour.
FE: Portable fire extinguisher.

Wet Well

NFPA 820 Table 2 requires the wet well be Class I Division 1 with no ventilation or Class I Division 2 if it is continuously ventilated at 12 air changes per hour. It also requires combustible gas detection in the wet well.

Dry Well

NFPA 820 requires the dry well be classified as Class I Division 2 with no ventilation and unclassified if it is continuously ventilated at six air changes per hour. No combustible gas detection is required in the dry well by NFPA 820.

California Title 8 requires the dry well to be Class I Division 2 unless there is continuous ventilation, gas detection, and automatic de-energization upon ventilation/gas detection failure.

Alternatives for classifying the dry well are listed below:

1. Place the electrical equipment above grade in weatherproof enclosures and classify the dry well as Class I Division 2 with no ventilation and no dry well combustible gas detection.
2. Place electrical equipment in dry well and provide continuous ventilation, combustible gas detection, and automatic de-energization upon ventilation/gas detection failure to declassify the dry well.

Appendix D

APPENDIX D
NORTH COAST INTERCEPTOR MANHOLE OBSERVATIONS ON VCP GRAVITY SEGMENT

Field Observation of Manholes on VCP Gravity Portion

A field observation of the manholes on the VCP gravity portion of the NCI was made with the assistance of City staff. The observation consisted of viewing the manholes from the street surface and probing the interior surfaces where necessary.

Following is a summary table of the observations with recommended repairs/rehabilitation. The detail field reports are included at the back of this section together with photographs.

Location	Plan Station	Observations	Recommended Actions
Catalina at El Camino	31+92	Channel in base and shaft lined with PVC – in good condition. Brick grade rings in poor condition.	Replace grade rings.
Catalina at St. Ann's Dr.	41+67	Deterioration of the shaft and base concrete.	Repair and line base and shaft.
Glenneyre at St. Ann's Dr.	45+52	Deterioration of the shaft and base concrete. Steps badly corroded.	Repair and line base and shaft. Remove steps.
Glenneyre at Thalia St.	48+69	Some concrete softening in the base and mid shaft section.	Repair and line base and shaft.
Glenneyre at Anita St.	53+14	Deterioration of the shaft and base concrete.	Repair and line base and shaft. Replace frame and cover.
Glenneyre at Oak St.	57+10	Slight concrete softening of base, but not severe.	Monitor for increased deterioration.
Glenneyre at Cress St.	62+87	Slight concrete softening of base, but not severe.	Monitor for increased deterioration.
Glenneyre at Mountain Rd.	67+37	Slight concrete softening of base, but not severe.	Monitor for increased deterioration.
Glenneyre at Calliope St.	72+27	Polyurethane lining failed and significant deterioration of the shaft and base. Badly corroded steps.	Replace manhole completely with PVC line manhole.

Field Observation of Air Release Installations

Field observations were made of selected air release assemblies with the assistance of City staff. The observation consisted of viewing the air release valves from the street surface.

Following is a summary table of the observations. The detail field reports are included at the back of this section together with photographs.

Location	Plan Station	Observations	Recommended Actions
Through St. at Legion St.	25+59	The circular manhole vault is in good condition. No odor detected.	No action.
Galen Dr. at Bluebird Canyon	77+80	The circular manhole vault is in good condition. No odor detected.	No action.
Pacific Coast Hwy. at Victoria Dr.	122+60	The circular manhole shaft is lined with PVC. Slight odor detected.	No action.
Pacific Coast Hwy. near Treasure Island	147+00	The circular manhole vault is in good condition. Odor detected.	No action.

MANHOLE INSPECTION REPORT

Date: 1/6/03 Time 9:30 (AM) PM By: P. STONE

Manhole Location: Street: THROUGH ST.
Nearest Intersection: LEGION ST.

Manhole Station: 25+59

Manhole Type: (A) or B ARV

Pipe Size: 24" Flow Depth: —

CONDITION

MANHOLE SHAFT & BASE

Item	Good			Fair			Poor			Very Poor		
	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base
Exposed Aggregate	✓	✓	✓									
Softening Concrete	✓	✓	✓									
Exposed Steel	✓	✓	✓									
Bricks/Mortar												

COVER Size: 24" Bolt Down Yes / (No)

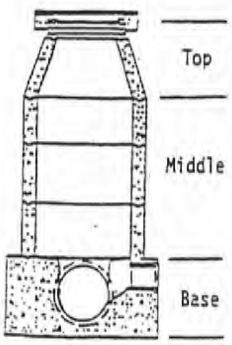
	Good	Fair	Poor	Very Poor
Grade Rings	✓			
Frame & Cover	✓			

COATING None ✓ PVC __ Polyurethane __ Fiberglass __

	Good			Fair			Poor			Very Poor		
	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base
Bubbles												
Peeling												
Missing Areas												

Comments: No odor.
Storm water enters thru vent opening

Type A



Type B

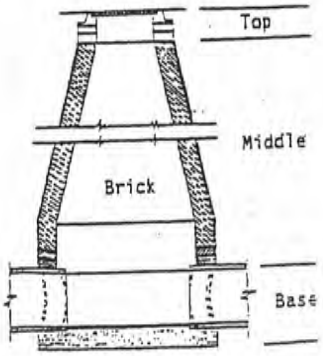


PHOTO #369

AIR RELEASE VALVE ASSEMBLY MANHOLE AT STATION 25+59
(Through Street at Legion Street)

MANHOLE INSPECTION REPORT

Date: 1/6 Time 9:45 (AM) / PM By: P. STONE

Manhole Location: Street: CATALINA ST.
Nearest Intersection: @ ST. ANN'S

Manhole Station: 41+67

Manhole Type: (A) or B

Pipe Size: 27" Flow Depth: 1/4

CONDITION

MANHOLE SHAFT & BASE

Item	Good			Fair			Poor			Very Poor		
	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base
Exposed Aggregate				↘	↘	↘						
Softening Concrete							↘	↘	↘			
Exposed Steel												
Bricks/Mortar												

COVER Size: 24" Bolt Down Yes (No)

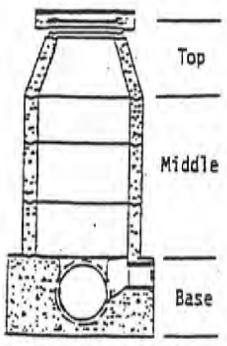
	Good	Fair	Poor	Very Poor
Grade Rings			↘	
Frame & Cover		↘		

COATING None ↘ PVC __ Polyurethane __ Fiberglass __

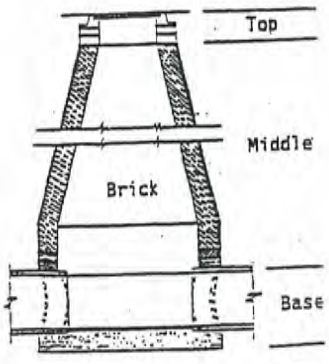
	Good			Fair			Poor			Very Poor		
	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base
Bubbles												
Peeling												
Missing Areas												

Comments: Had been sprayed w/ insecticide for cockroaches.

Type A

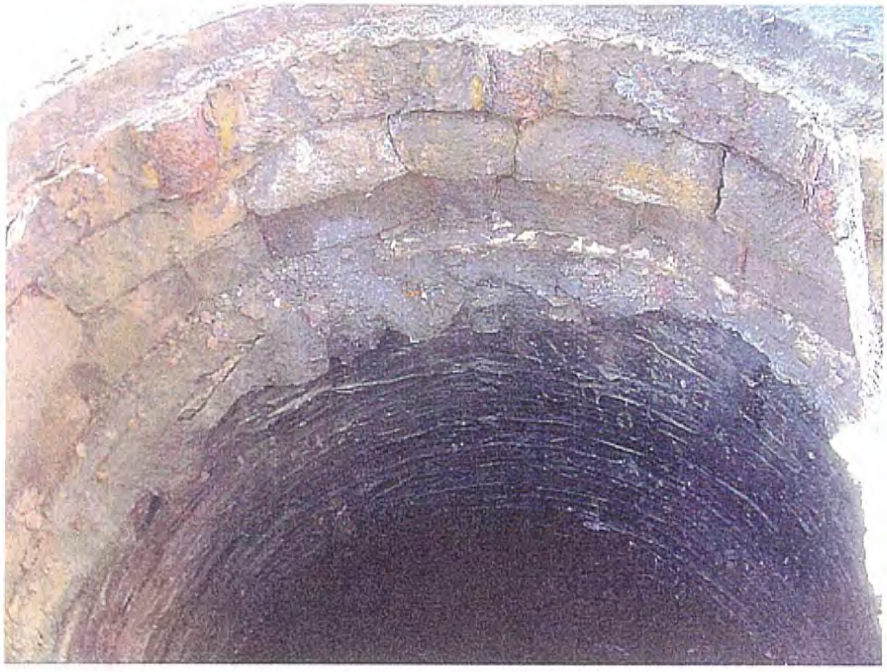


Type B



Pages 372 & 373

MANHOLE AT STATION 31+92
(Catalina Street at El Camino)



MANHOLE INSPECTION REPORT

Date: 1/6/03 Time 9:50 (AM) / PM By: P. STONE

Manhole Location: Street: GLENNEYRE ST.
Nearest Intersection: @ ST. ANNS

Manhole Station: 45 + 52

Manhole Type: (A) or B

Pipe Size: 27" Flow Depth: 1/4

CONDITION

MANHOLE SHAFT & BASE

Item	Good			Fair			Poor			Very Poor		
	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base
Exposed Aggregate												
Softening Concrete							↘	↘	↘			
Exposed Steel												
Bricks/Mortar												

COVER Size: 24" Bolt Down Yes / (No)

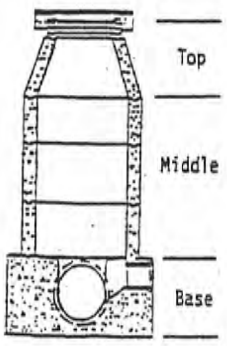
	Good	Fair	Poor	Very Poor
Grade Rings			↘	
Frame & Cover			↘	

COATING None ↘ PVC __ Polyurethane ___ Fiberglass __

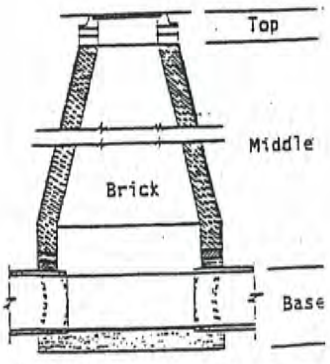
	Good			Fair			Poor			Very Poor		
	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base
Bubbles												
Peeling												
Missing Areas												

Comments: Steps in MH - badly corroded, not safe

Type A



Type B



MANHOLE AT STATION 41+67
(Catalina Street & St. Ann's Drive)

MANHOLE INSPECTION REPORT

Date: 1/6/03 Time 9:55 (AM) / PM By: P. STONE

Manhole Location: Street: GLENNEYRE ST.
Nearest Intersection: THALIA ST.

Manhole Station: 48 + 69

Manhole Type: (A) or B

Pipe Size: 27" Flow Depth: 1/4

CONDITION

MANHOLE SHAFT & BASE

Item	Good			Fair			Poor			Very Poor		
	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base
Exposed Aggregate												
Softening Concrete				↘				↘	↘			
Exposed Steel												
Bricks/Mortar												

COVER Size: 24" Bolt Down Yes / (No)

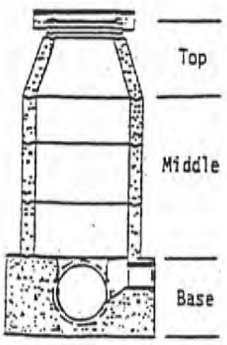
	Good	Fair	Poor	Very Poor
Grade Rings		↘		
Frame & Cover		↘		

COATING None ↘ PVC __ Polyurethane ___ Fiberglass __

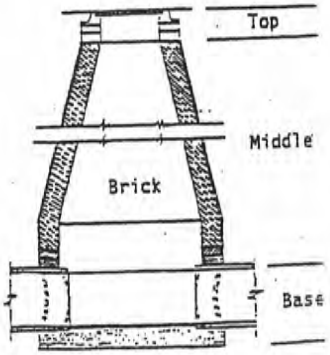
	Good			Fair			Poor			Very Poor		
	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base
Bubbles												
Peeling												
Missing Areas												

Comments: _____

Type A



Type B



MANHOLE INSPECTION REPORT

Date: 1/6/03 Time 10:00 (AM)/ PM By: R. STONE

Manhole Location: Street: GLENNEYRE ST.
Nearest Intersection: @ ANITA ST.

Manhole Station: 53 + 14

Manhole Type: (A) or B

Pipe Size: 27" Flow Depth: 1/3

CONDITION

MANHOLE SHAFT & BASE

Item	Good			Fair			Poor			Very Poor		
	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base
Exposed Aggregate										✓	✓	✓
Softening Concrete										✓	✓	✓
Exposed Steel												
Bricks/Mortar												

COVER Size: 24" Bolt Down Yes / (No)

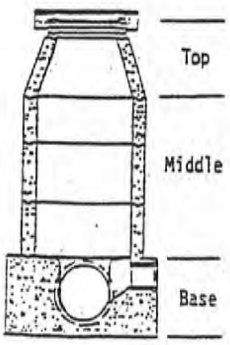
	Good	Fair	Poor	Very Poor
Grade Rings				✓
Frame & Cover				✓

COATING None ✓ PVC __ Polyurethane __ Fiberglass __

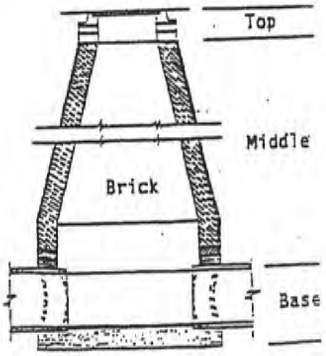
	Good			Fair			Poor			Very Poor		
	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base
Bubbles												
Peeling												
Missing Areas												

Comments: _____

Type A



Type B



MANHOLE INSPECTION REPORT

Date: 1/6/03 Time 10:10 (AM) / PM By: P. STONE

Manhole Location: Street: GLENNEYRE ST.
Nearest Intersection: Oak St.

Manhole Station: 57 + 10

Manhole Type: (A) or B

Pipe Size: 27" Flow Depth: 1/4

CONDITION

MANHOLE SHAFT & BASE

Item	Good			Fair			Poor			Very Poor		
	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base
Exposed Aggregate												
Softening Concrete				✓	✓				✓			
Exposed Steel												
Bricks/Mortar												

COVER Size: 24" Bolt Down Yes / (No)

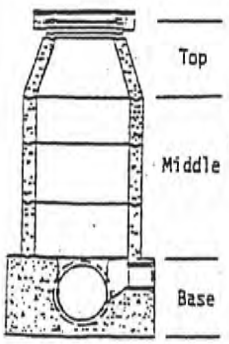
	Good	Fair	Poor	Very Poor
Grade Rings		✓		
Frame & Cover		✓		

COATING None ✓ PVC __ Polyurethane __ Fiberglass __

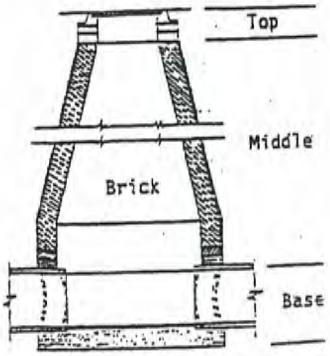
	Good			Fair			Poor			Very Poor		
	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base
Bubbles												
Peeling												
Missing Areas												

Comments: _____

Type A



Type B



MANHOLE AT STATION 45+52
(Glenneyre Street and St. Ann's Drive)

MANHOLE INSPECTION REPORT

Date: 1/6/03 Time 10:15 (AM) / PM By: P. STONE

Manhole Location: Street: GLENNEYRE ST.
Nearest Intersection: @ CRESS ST.

Manhole Station: 62 + 87

Manhole Type: (A) or B

Pipe Size: 27" Flow Depth: 1/2

CONDITION

MANHOLE SHAFT & BASE

Item	Good			Fair			Poor			Very Poor		
	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base
Exposed Aggregate												
Softening Concrete				↘	↘				↘			
Exposed Steel												
Bricks/Mortar												

COVER Size: 24" Bolt Down Yes / (No)

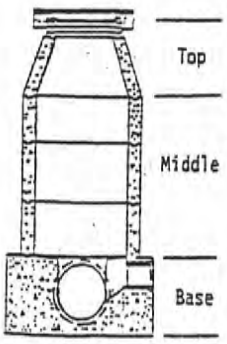
	Good	Fair	Poor	Very Poor
Grade Rings		↘		
Frame & Cover		↘		

COATING None ↘ PVC __ Polyurethane __ Fiberglass __

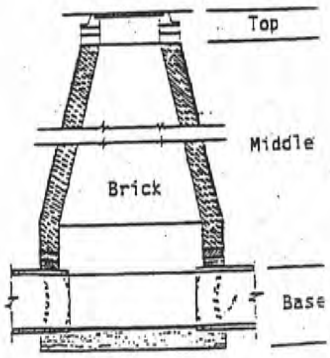
	Good			Fair			Poor			Very Poor		
	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base
Bubbles												
Peeling												
Missing Areas												

Comments: _____

Type A



Type B



MANHOLE AT STATION 57+10
(Glenneyre Street at Oak Street)

MANHOLE INSPECTION REPORT

Date: 1/6/03 Time 10:25 (AM) / PM By: P. STONE

Manhole Location: Street: GLENNEYRE ST.
Nearest Intersection: Mountain Rd.

Manhole Station: 67+37

Manhole Type: (A) or B

Pipe Size: 27" Flow Depth: 1/4

CONDITION

MANHOLE SHAFT & BASE

Item	Good			Fair			Poor			Very Poor		
	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base
Exposed Aggregate												
Softening Concrete				↘	↘				↘			
Exposed Steel												
Bricks/Mortar												

COVER Size: ___ Bolt Down Yes / (No)

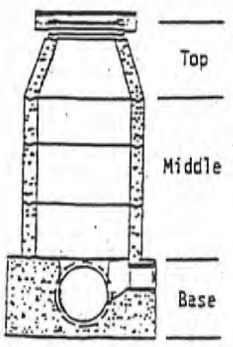
	Good	Fair	Poor	Very Poor
Grade Rings		↘		
Frame & Cover		↘		

COATING None ↘ PVC __ Polyurethane ___ Fiberglass __

	Good			Fair			Poor			Very Poor		
	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base
Bubbles												
Peeling												
Missing Areas												

Comments: _____

Type A



Type B

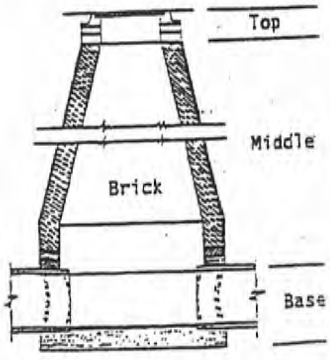


PHOTO ... 375

MANHOLE AT STATION 62+87
(Glenneyre Street at Cress Street)

MANHOLE INSPECTION REPORT

Date: 1/6/03 Time 10:35 (AM)/ PM By: P. STONE

Manhole Location: Street: GLENNEYRE ST.
Nearest Intersection: @ CALLIOPE ST. (DISCHARGE TO BLUEBIRD P.S)
Manhole Station: 72 + 27

Manhole Type: (A) or B

Pipe Size: ____ Flow Depth: 1/3

CONDITION

MANHOLE SHAFT & BASE

Item	Good			Fair			Poor			Very Poor		
	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base
Exposed Aggregate										↘	↘	↘
Softening Concrete										↘	↘	↘
Exposed Steel												
Bricks/Mortar												

COVER Size: 24" Bolt Down Yes /(No)

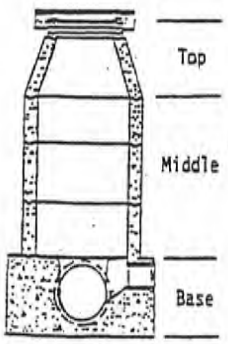
	Good	Fair	Poor	Very Poor
Grade Rings				↘
Frame & Cover				↘

COATING None__ PVC __ Polyurethane ↘ Fiberglass __

	Good			Fair			Poor			Very Poor		
	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base
Bubbles										↘	↘	↘
Peeling										↘	↘	↘
Missing Areas										↘	↘	↘

Comments: Steps in MH - badly corroded - not safe

Type A



Type B

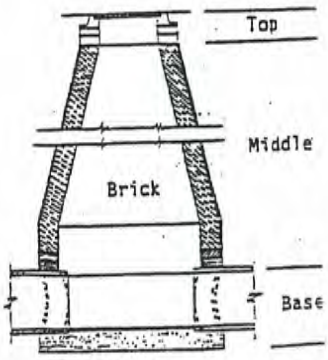


Photo ... 379 & 380

MANHOLE AT STATION 67+37
(Glenneyre Street at Mountain Road)

MANHOLE INSPECTION REPORT

Date: 1/6/03 Time 10:45 AM / PM By: P. STONE

Manhole Location: Street: GALEN DR.
Nearest Intersection: BLUEBIRD CYN. DR.

Manhole Station: 77+80

Manhole Type: (A) or B ARV

Pipe Size: 27" Flow Depth: -

CONDITION

MANHOLE SHAFT & BASE

Item	Good			Fair			Poor			Very Poor		
	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base
Exposed Aggregate												
Softening Concrete			↘									
Exposed Steel												
Bricks/Mortar												

COVER Size: 24" Bolt Down Yes (No)

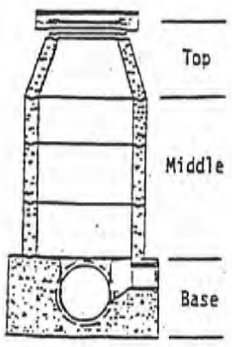
	Good	Fair	Poor	Very Poor
Grade Rings	↘			
Frame & Cover	↘			

COATING None ↘ PVC __ Polyurethane ___ Fiberglass __

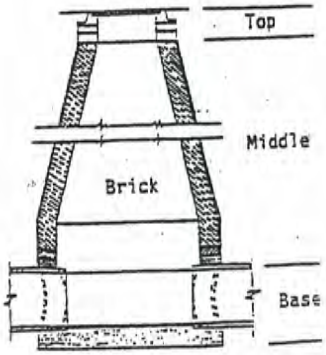
	Good			Fair			Poor			Very Poor		
	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base
Bubbles												
Peeling												
Missing Areas												

Comments: Collects water thru vent opening when it rains.

Type A



Type B



MANHOLE AT STATION 72+27
(Glenneyre Street at Calliope Street)

MANHOLE INSPECTION REPORT

Date: 1/6/03 Time 11:00 (AM) / PM By: P. S.

Manhole Location: Street: PACIFIC COAST HWY
Nearest Intersection: ALBERTSONS - LEFT TURN LANE

Manhole Station: 147 + 00

Manhole Type: (A) or B ARV

Pipe Size: 24" Flow Depth: —

CONDITION

MANHOLE SHAFT & BASE

Item	Good			Fair			Poor			Very Poor		
	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base
Exposed Aggregate												
Softening Concrete	✓	✓				✓						
Exposed Steel												
Bricks/Mortar												

COVER Size: 24" Bolt Down Yes / (No)

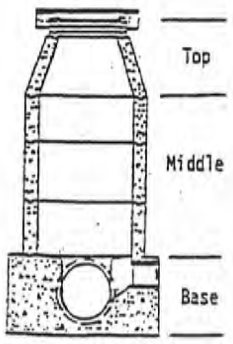
	Good	Fair	Poor	Very Poor
Grade Rings	✓			
Frame & Cover	✓			

COATING None ✓ PVC __ Polyurethane __ Fiberglass __

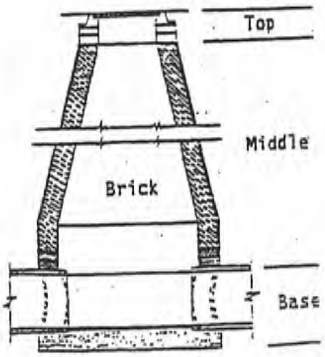
	Good			Fair			Poor			Very Poor		
	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base
Bubbles												
Peeling												
Missing Areas												

Comments: Slight odor could be detected.

Type A



Type B



MANHOLE INSPECTION REPORT

Date: 1/6/07 Time 9:35 (AM)/ PM By: P. STONE

Manhole Location: Street: CATALINA
Nearest Intersection: EL CAMINO

Manhole Station: 31 + 92

Manhole Type: (A) or B

Pipe Size: 24" Flow Depth: 1/3

CONDITION

MANHOLE SHAFT & BASE

Item	Good			Fair			Poor			Very Poor		
	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base
Exposed Aggregate			↘									
Softening Concrete			↘									
Exposed Steel			↘									
Bricks/Mortar												

COVER Size: 24" Bolt Down (Yes)/ No

	Good	Fair	Poor	Very Poor
Grade Rings				↘
Frame & Cover				↘

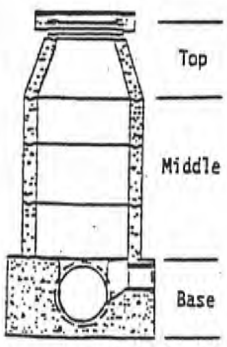
Brick grade rings

COATING None__ PVC ↘ Polyurethane ___ Fiberglass __

	Good			Fair			Poor			Very Poor		
	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base	Top	Mid	Base
Bubbles	None	None										
Peeling	"	"										
Missing Areas			↘									

Comments: Channel in base lined w/ PVC. Shelf surface unlined. Grade rings coated w/ Bituminastic

Type A



Type B

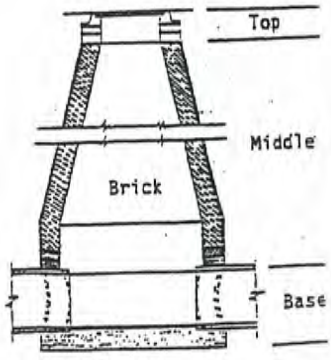


PHOTO ...370 & 37

AIR RELEASE VALVE ASSEMBLY AT STATION 122+60
(PCH at Nyes Place)

Appendix E

APPENDIX E
SURVEY OF OTHER SEWERING AGENCIES

City of Laguna Beach
North Coast Interceptor Assessment

SURVEY OF OTHER SEWERING AGENCIES

1. How many sewer pumping stations does your agency have in operation?

2. What is the range of size and length of the force mains from these pumping stations?

3. What is the pipe material of the force mains?

4. How long have the force mains been in operation?

5. Have any of the force mains exhibited problems due to internal corrosion of the pipe material?

6. Does the force main profile have intermediate high points where air could accumulate that may be vented with air release valves?

7. Have any of the force mains been damaged by outside forces, i.e. construction equipment working in the vicinity of the pipe, earthquakes, etc.?

8. Has your agency adopted a standard pipe material for sewer force mains?

9. Have you had asbestos cement pipe or fiberglass reinforced plastic pipe (FRP) used in any force mains in the past? If so, what has your experience been regarding the longevity of the pipe material in this application, particularly with relation to internal corrosion and structural integrity?

10. Does your agency have any policy or practices relating to provisions for redundancy or reliability in sewer force main design?

11. Do you have any other comments relative to pipe material selection or design for sewer force mains?

12. Does your agency have any criteria for emergency wet well storage? (This is typically a minimum retention time above the high water level.)

City of Laguna Beach
North Coast Interceptor Assessment

SURVEY OF OTHER SEWERING AGENCIES

Agency	# Pump Stations	Emergency Wet Well Storage Provisions	Force Main: Size Range (in) 4	8	12	18	20	21	42	Length Range (ft)	Material: DIP	CIP	PVC	C900 PVC	C905 PVC	PVC Class 150	ACP	Steel	HDPE	Transite Class 150	RPMP	Techite	Construction Date: 1950's	1960's	1970's	1980's	1990's	2000	Intermediate High Points	Redundancy	Preferred Force Main Material	Material: Internal Corrosion Problems: DIP	DIP (PVC lined)	ACP	Steel	Steel (CM lined)	Other Comments
OCSD	20	Self Cleaning Wet Wells		x					x	100' - 2 miles	x				x			x				x			x	x	x	x	x	x	PVC (Ipex), DIP (Polyplus)		x			x	Any material susceptible to corrosion will corrode in a force main
IRWD	17	Maintain some storage capacity	x		x					200' - 2500'	x		x					x						x	x	x	x	x	x		None	x		x	x		
SMWD	21	Auxilary Wet Well 1 hr peak flow		x				x		1000' - 8000'	x			x	x				x			x		x	x	x	x	x	x		C905 PVC						Had good luck with PVC and poly lined DIP w/ restrained joints.
CMSD	20	Maintain some storage capacity	x			x				55' - 3300'	x												x						x	x	Polyethylene Wrapped DIP	x					Regular Pump Station Maintenance is a must.
MNWD	18	Maintain Emergency storage					x				x						x					x							x	x	C905 PVC						Prefer lining with HDPE therefore eliminate joints.
SCWD	14	Under Development		x	x					up to 1 mile		x											x						x		CIP						
C.H.B.	27	High Wet Well Alarm	x		x					10' - 2100'		x		x		x	x		x	x	x			x	x	x	x	x			None						City does not have an inspection program for force mains therefore condition is unknown.
C.N.B.	STILL AWATING RESPONSE																																			
LACSD	STILL AWATING RESPONSE																																			

BOYLE