BROWN AND CALDWELL

Appendix D. BAF for the Point Loma Wastewater Treatment Plant Protocol for Phase I and Phase II Pilot Testing

City of San Diego
Metropolitan Wastewater Department

BIOLOGICAL AERATED FILTER FOR THE POINT LOMA WASTEWATER TREATMENT PLANT

PROTOCOL FOR PILOT TESTING

PHASE I

REVISION NO. 4

(Supercedes all other versions)

February 19, 2004

Prepared for
Engineering and Program Management &
Operation and Maintenance Divisions

by
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PILOT TEST PROTOCOL

City of San Diego MWWD
Biological Aerated Filter Pilot Test at PLWTP – Phase I

I. BACKGROUND

A technical memorandum (TM) was prepared that evaluated the technical and economic feasibility of utilizing the biological aerated filter (BAF) technology to provide secondary treatment technology at the Point Loma Wastewater Treatment Plant (PLWTP). Information from US BAF facilities visited by Brown and Caldwell (BC) and the City of San Diego (City), data received from the two BAF vendors and from the literature was used to develop the preliminary costs reported in this TM. However, the PLWTP facility has some unique characteristics that differ from facilities where data were collected. The temperature and strength of the PLWTP wastewater as well as other wastewater characteristics differ enough to possibly impact performance of the BAF system. In addition, many reports on the performance of BAFs are related to operations employing multistage BAF that provide carbonaceous BOD removal, nitrification, and/or denitrification; it is difficult to differentiate the performance of these systems on the removal of carbonaceous BOD, which is the primary design goal of the BAF technology that is being considered for the PLWTP facility. Evaluation of key design parameters through pilot testing of candidate BAF systems and a candidate clarifier/thickener system when operating under San Diego conditions will provide crucial information that will allow the City to evaluate the technical and economic feasibility of the BAF technology in more detail than has been possible to date.

Three implementation options (shown in the Figure 1) form the basis of the pilot test. These options are as follows:

> Option 1 – Use BAF to treat advance primary effluent to secondary level. Recycle backwash to the primary sedimentation basin (PSB) influent channel to co-settle with primary sludge.
>
> Option 2 – Use BAF to treat advance primary effluent to secondary level. Thicken backwash in a ballasted clarifier/thickener (BC/T). Recycle BC/T effluent to the PSB influent channel. Pump thickened solids to the sludge holding tank for subsequent digestion.
>
> Option 3 – Replace existing PSBs with BC/Ts. Use BAF to treat primary effluent from the BC/T. Recycle backwash to the BC/T influent and co-settle BAF waste sludge with primary sludge. Pump thickened solids to the sludge holding tank for subsequent digestion.

A process flow diagram representing a scheme to Option 1, i.e. Phase I of the Study, is shown in Figure 2. A site plan showing the location of the pilot test facility relative to the existing PLWTP and the arrangement of the pilot units are shown on Figures 3 and 4, respectively. Complete design drawings are provided in Exhibit A.

City and BC representatives visited European facilities with full-scale BIOSTYR, BIOFOR and/or Densadeg in operation. The group found Densadeg to be very effective in thickening

backwash waste from the BIOFOR and was equally effective as a high rate primary clarifier. Because of the observed performance, the City subsequently directed BC to increase the

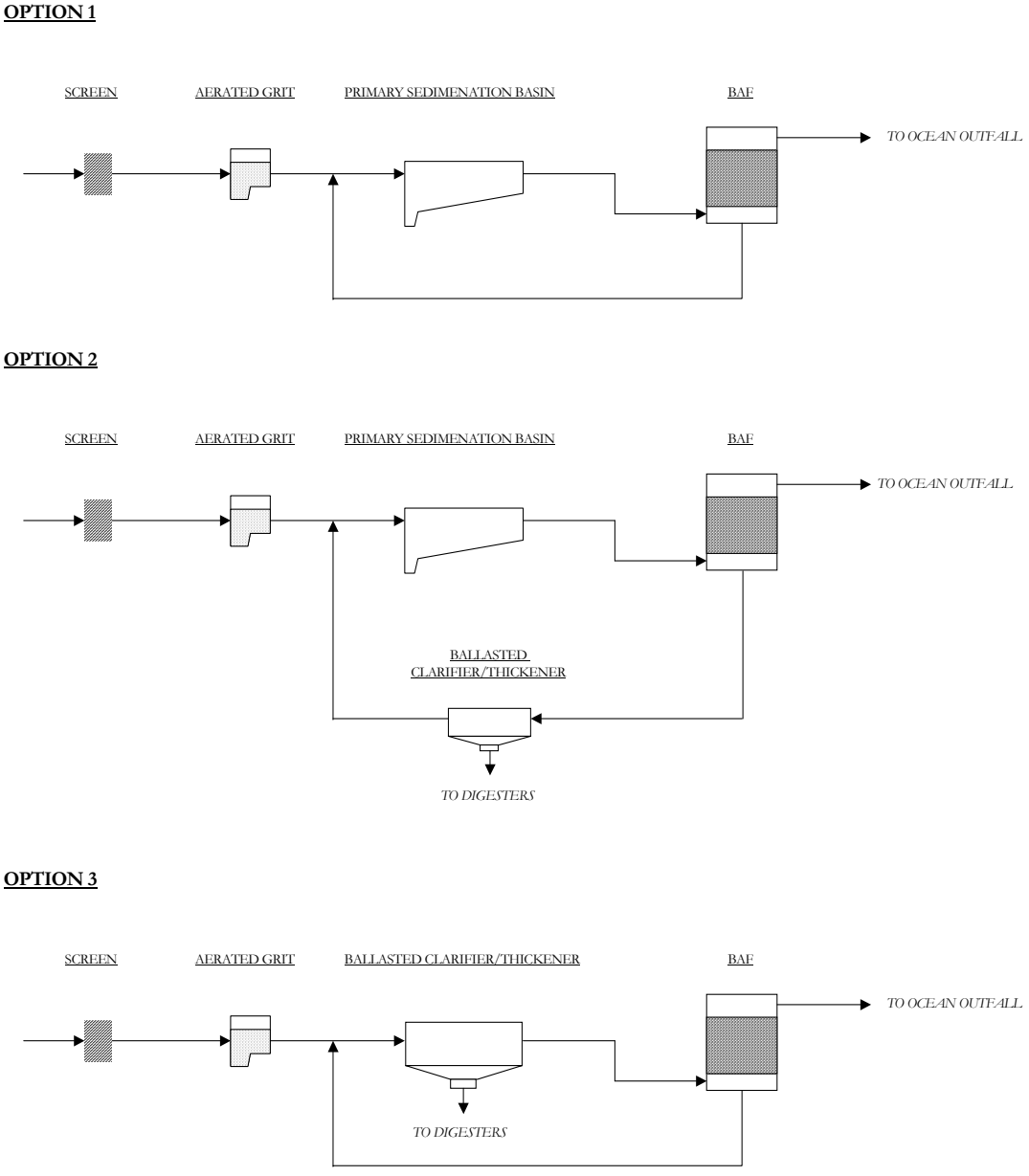


FIGURE 1 - OPTIONS FOR INCORPORATING BAF AT THE PLWTP

testing period for Densadeg. It was also concluded, after extensive discussions with the manufacturer of Densadeg, Ondeo-Degremont, Inc. (ODI), that Option 2 could not be evaluated because of the low volumes of backwash generated relative to the capacity of the Densadeg. The Densadeg pilot unit has a minimum capacity of 100 gpm. By comparison, only about 60 gpm of backwash is generated with both the BIOFOR and BIOSTYR pilot units backwashing. In addition the backwash process only lasts for 60 minutes. Under this condition, the Densadeg unit will not be able to develop a sufficient sludge blanket to reflect

normal operations. Therefore, the pilot test will be developed to simulate Options 1 and 3 only. This protocol is for Phase I, simulation of Option 1.

II. TEST OBJECTIVES

The main objectives for the pilot test are as follows:

To validate the following design parameters proposed by each BAF vendor:

Parameter	BIOFOR C	BIOFOR N	BIOSTYR
BOD loading rate (30-d running average) lb/1000 cf-d	224	90	218
TSS loading rate (30-d running average) lb/1000 cf-d	100	45	99.7
Hydraulic loading rate (MMF) (gpm/sf)	1.9	3.9	2.0
Hydraulic loading rate (PWWF) (gpm/sf)	3.0	6	2.9
Process air supply (MMF) (scfm/sf)	0.52	0.52	0.85
Backwash air (scfm/sf)	5.35	5.35	0.85

To determine the performance of the two BAF systems under consideration when operated over a range of anticipated seasonal hydraulic, organic and solids loadings
To develop solids generation factors required to support the selection of the appropriate solids thickening scheme that would obviate the need for construction of additional anaerobic digestion at the PLWTP
To determine power requirements for each BAF system
To determine the headloss development over the operational period
To determine aeration requirements for each BAF system
To determine backwash conditions (frequency, volume, air and water rates) associated with each BAF system
To ascertain the potential for media loss and plugging potential
To determine the settleability of the backwash solids, particularly focusing on their ability to co-settle and co-thicken with primary sludge

III. SCHEDULE

A. Overall Pilot Test Schedule

The pilot test is scheduled to commence February 2004 and continue until August 2004. The pilot test is expected to proceed as follows:

Date	Event
January – February, 2004	Project Startup
February –May, 2004 PHASE I	Testing of BIOSTYR and BIOFOR using primary effluent pumped from the primary effluent channel. No processing of backwash solids will occur. Occasional evaluation of solids settleability performed.

Date	Event
June-August, 2004 PHASE II	Pre-screened wastewater pumped from the screening channels (at the headworks) to the Densadeg. Testing of BIOSTYR and BIOFOR using Densadeg effluent. Backwash from BAF will be co-settled/co-thickened with the pre-screened wastewater in the Densadeg.

At the conclusion of the pilot test, a report will be prepared summarizing the pilot test findings and providing recommended design criteria for the full-scale design for each unit tested. A revised cost estimate will also be prepared, in light of the pilot test findings.

B. Phase I –Schedule

Date	Event
January 12, 2004	Delivery of BIOSTYR and BIOFOR pilot test units at PLWTP
January 23, 2004	Completion of the installation of pilot units, including media, anchoring and leveling of units, piping connections, electrical connections, and initial shakedown
January 26 to February 6, 2004	Training performed by ODI and US Filter on the proper operation of the BAF pilot test units
January 26 to February 22, 2004	Acclimation of BAF pilot test units Morning sample collection
February 23, 2004	Begin sampling and monitoring program
February 23 to May 31, 2004	To take advantage of wet weather conditions, initially operate (February-March, 2004) at increased rate relative to the proposals Evaluate pressure build-up Evaluate performance of each BAF pilot unit Evaluate backwash requirements Evaluate settleability of backwash solids Evaluate power requirements Summarize monthly data Meet to discuss data Determine changes in operating conditions, if necessary

IV. PILOT TEST UNIT DESCRIPTION

Specifications for the Biostyr, Biofor-C and Biofor-N pilot test units are provided in Exhibit B.

V. SAMPLING PROTOCOL

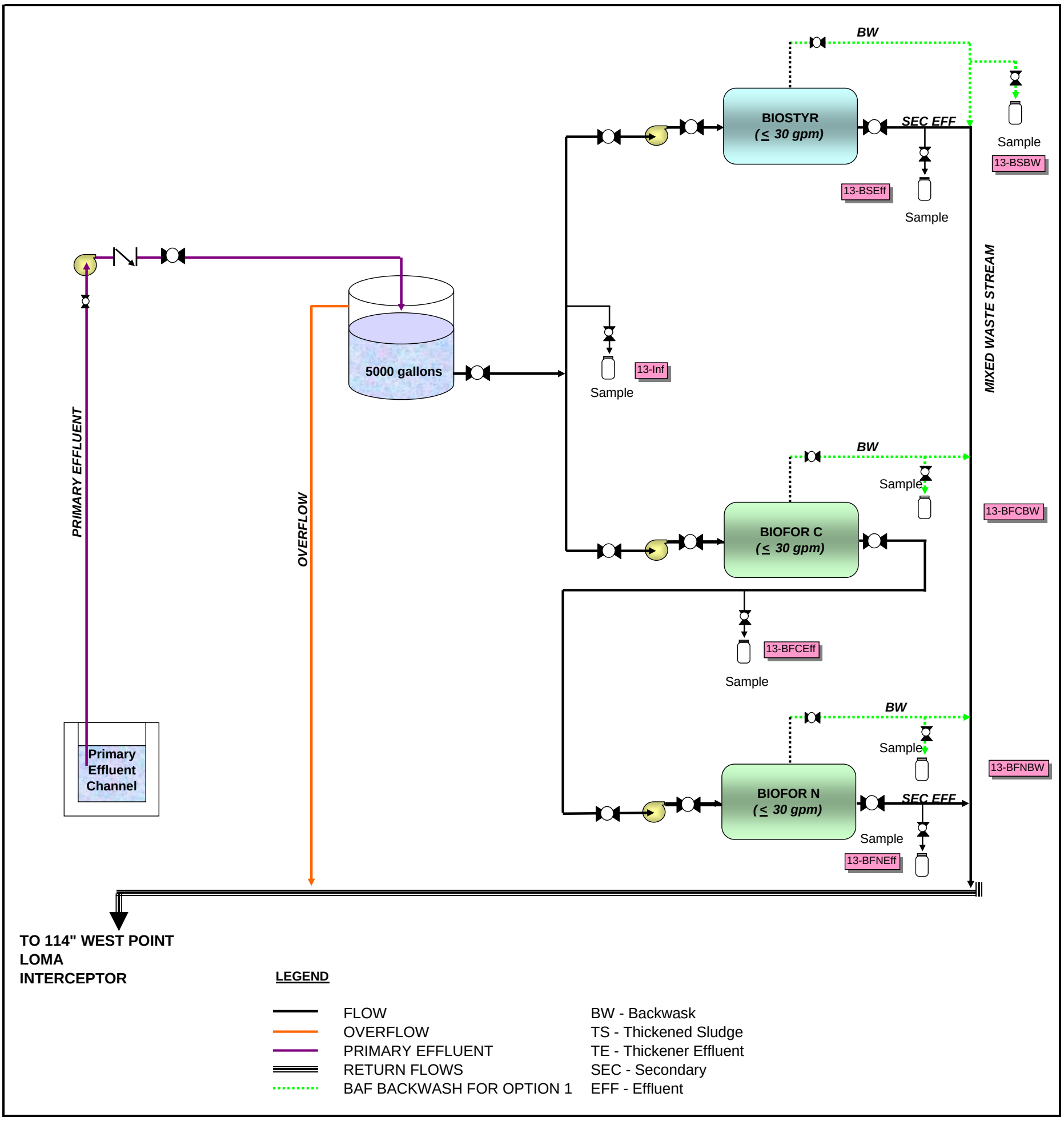
The Phase I sampling program is presented in Table 1. Sampling locations noted in Table 1 can be cross-referenced using Figure 2.

Table 1

City of San Diego MWWD
BAF Pilot Study Sampling and Monitoring Program
Phase I

Analyte	Analytical Method	Analytical Equipment	Container	Volume (mL)	Preservative	Max Holding Time	Sampling Frequency	Sampling Locations							ANALYSIS PER DAY
								Influent	Biostyr		Biofor C		Biofor N		
									Effluent	Backwash	Effluent	Backwash	Effluent	Backwash	
DAILY SAMPLING															
24-HR Time-Composited															
BOD_5 (Total)	SM 5210-B	Lab	P, G	1,000	4-deg C	24h	EOD-1	X	X		X		X		4
$SBOD_5$ (Soluble)		Lab	P, G	1,000	4-deg C	24h	EOD-1	X	X		X		X		4
$CBOD_5$ (Carbonaceous)				1,000	4-deg C	24h	EOD-2	X	X		X		X		4
$SCBOD_5$ (SolubleCarbonaceous)		Lab	P, G	1,000	4-deg C	24h	EOD-2	X	X		X		X		4
COD	SM 5220-C	Lab	P, G	100	4-deg C, add H_2SO_4 to pH<2	28d	D	X	X		X		X		4
TSS	SM 2540-D	Lab	P, G	200	4-deg C	7d	D	X	X		X		X		4
VSS	SM 2540-E	Lab	P, G	200	4-deg C	7d	D	X	X		X		X		4
TKN	SM 4500-F	Lab	P, G	500	4-deg C, add H_2SO_4 to pH<2	28d	D	X	X		X		X		4
NH_3-N	EPA 350.3	Lab	P, G	500	4-deg C, add H_2SO_4 to pH<2	28d	D	X	X		X		X		4
Orthophosphate	SM 4500-P	Lab	P, G	100	4-deg C, add H_2SO_4 to pH<2	28d	D	X	X		X		X		4
Alkalinity	SM 2320-B	Lab	P, G	200	4-deg C	14d	D	X	X		X		X		4
Pilot Test Unit Instrument Readings			TOTAL =	3,800											
Air flow	Pilot test unit instrument						D-NO; D-BO								
Air Pressure	Pilot test unit instrument						D-NO; D-BO								
Sample port pressure (P1, P2, P3, P4)	Pilot test unit instrument						D-NO; D-BO								
Backwash water pressure	Pilot test unit instrument						D-BO								
Power demand	Pilot test unit instrument						D-NO; D-BO								
Media loss	Visual						D-NO; D-BO								
Conditions of screen	Visual						D-NO								
Backwash characteristics							D-BO								
Other observations							D-NO; D-BO								
Grab Samples-Portable Meter Readings															
Temperature	Portable Meter	pH Meter					D	X	X	X	X	X	X	X	
Dissolved Oxygen	Portable Meter	DO Meter					D	X	X	X	X	X	X	X	
pH	Portable Meter	pH Meter					D	X	X	X	X	X	X	X	
Turbidity	Portable Meter	Turbidity Meter					D	X	X	X	X	X	X	X	
EVERY OTHER DAY SAMPLING															
Grab Samples															
BOD_5 (Total)	SM 5210-B	Lab	P, G	1,000	4-deg C	24h	EOD			X		X		X	3
$SBOD_5$ (Soluble)		Lab	P, G	1,000	4-deg C	24h	EOD			X		X		X	3
COD	SM 5220-C	Lab	P, G	100	4-deg C, add H_2SO_4 to pH<2	28d	EOD			X		X		X	3
TSS	SM 2540-D	Lab	P, G	200	4-deg C	7d	EOD			X		X		X	3
VSS	EPA 160.4	Lab	P, G	200	4-deg C	7d	EOD			X		X		X	3
TS	EPA 160.3	Lab	P, G	200	4-deg C	7d	EOD			X		X		X	3
VS	EPA 160.4	Lab	P, G	200	4-deg C	7d	EOD			X		X		X	3
SETS (Settleable solids)	SM 2540-F	Lab	P, G	200	4-deg C	48h	EOD			X		X		X	3
			TOTAL =	3,100											
OCCASIONAL SAMPLING															
- THREE TIMES PER WEEK															
NO_2-N, NO3-N	HACH Method 8507, 8171	Lab and Outside Lab	P, G	100	4-deg C	48h	OCC	X	X		X		X		4
- TWO TIMES PER WEEK															
Imhoff Settling	Imhoff Cone	On-Site	Imhoff	1,000	N/A	Immed	OCC			X		X		X	
		Outside Lab					OCC	X	X		X		X		
- THREE TIMES PER MONTH															
MS2 Bacteriophage Bioassay testing		Outside Lab					OCC		X				X		
- ONCE FOR WHOLE STUDY															
Diurnal - $TBOD_5$ and $CBOD_5$-2-hr Composites (1X)	SM 5210-B	Lab	P, G	1,000	4-deg C	24h	OCC	X	X		X		X		12
Diurnal- $SBOD_5$ and $SCBOD_5$ - 2-hr Composites (1X)	SM 5210-B	Lab	P, G	1,000	4-deg C	24h	OCC	X	X		X		X		12
Off gas test							OCC-NO								

D: daily
D-NO: Taken during normal operation only
D-BO: Taken during backwash operation only
EOD: every other day
EOD-1: every other day, pair samples-day 1
EOD-2: every other day, pair samples-day 2
EOD: even OCC: occasional
EOD-1: ev OCC-NO: occasional, but only during normal operations



BIOLOGICAL AERATED FILTER PILOT STUDY
PROCESS FLOW DIAGRAM - PHASE I
FIGURE 2

The sampling crew (consisting of O&M, EPMD and BC personnel) will be responsible for retrieving the composite bottles from the autosamplers and delivering them to the PLWTP Lab. The sampling crew will also fill out Chain-of-Custody forms (sample given in Exhibit C) required by the PLWTP Lab to accompany the sample bottles. The PLWTP Lab staff will label the bottles, complete the manifests, and analyze the samples for the parameters indicated on the manifests.

A. DAILY SAMPLING AND MONITORING

The following activities will be performed daily.

1. Composite Sampling

Daily time-based composite samples are to be collected of the influent and effluent streams of the Biostyr, Biofor-C and Biofor-N pilot units. Refrigerated autosamplers set at 4 degrees C are to be used. The autosampler will be programmed such that a 75-mL sample will be collected every 15 minutes. This will produce about a 7.2-L composite sample which will be divided into various sample bottles, some of which contain preservatives as noted in Table 1.

During weekdays, the PLWTP Operations and Process Control Staff will remove the composite sample bottle from the autosampler; replace it with an empty and labeled bottle (note that the autosampler will not be reprogrammed); fill out manifests; and deliver the composite sample bottle to the PLWTP Lab. BC will perform this task during the weekends. Detailed instructions are provided as Exhibit D.

Samples requiring TKN analysis will be placed in the refrigerator separately by the PLWTP Lab. Every Monday, the EPMD Sampling Crew will take all samples requiring TKN analysis and deliver it to the NCWRP Lab for analysis before 16:00.

2. Meter Readings

The temperature, dissolved oxygen, pH, and turbidity of the influent, effluent and backwash waste streams from each BAF pilot unit will be measured and recorded daily using portable meters. The readings will be recorded in daily pilot test unit meter readings sheet provided (samples given in Exhibit E). The portable meters will be calibrated daily by the EPMD or BC staff.

During weekdays at 06:30 and 22:00, the PLWTP Operations and Process Control Staff will perform this task. On weekends, BC will perform this task at 06:30 and 14:00 only when BAF backwash is to be sampled. The PLWTP Operations and Process Control Staff will do it at 14:00 (during non-backwash weekend days) and 22:00 on weekend evenings.

3. Pilot Test Unit Instrument Readings

Every day, the sampling crew will record information taken from each of the BAF pilot test unit instruments. The instrumentation differs between the BAF pilot units. The sampling crew will use the daily pilot test unit instrument readings log sheet provided in Exhibit E as a guide on the type of data to be recorded.

During weekdays at 06:30 and 22:00, the PLWTP Operations and Process Control Staff will perform this task. On weekends, BC will perform this task at 06:30 and 14:00 only when BAF backwash is to be sampled. The PLWTP Operations and Process Control Staff will do it at 14:00 (during non-backwash weekend days) and 22:00 on weekend evenings.

4. Headloss Measurements

Pressure transducers will be installed on each BAF pilot unit to determine the pressures at four locations along the height of the bed: one at the bottom, one near the top, and two in between in order to measure the headloss across BAF media. The aim of using these additional ports is to determine points of plugging along the media and possibly determine the locations where biomass growth and influent solids filtration occur over the period between backwashes.

BC will provide training for two days. Subsequently, EMPD staff will perform this task, including calibration of the pressure transducers and download of data from the data logger. EPMD will provide BC with the data daily via e-mail. EPMD will have its own laptop download and store the data. The same laptop will be used by BC to download data during the weekends. Detailed instructions are provided in Exhibit F.

B. EVERY OTHER DAY SAMPLING AND MONITORING

The following activities will be performed every other day.

1. Backwash Sampling and Monitoring

Backwashing of the BAF pilot test units will be scheduled on a specific time interval (initially every 24 hours) and set at time when the sampling crew is present (around 10:00 to 11:00 a.m. daily). Backwash times will be adjusted so that only one BAF unit is backwashed at a time. Backwash water will be collected in a backwash tank, mixed and then sampled. Mixing will be provided through a pump mixing system (see Figure 3 for a schematic of the mixing system). The mixing pump will be turned on after backwash is completed. The pump will be run for some time (about 3-5 minutes) to be sure that complete mixing is achieved in the tank. Daily backwash sample will be taken from the discharge line of the mixing pump. After the sample is taken, the pump will be turned off, the backwash tank will be drained and hosed off to clean the tank for the next backwash event.

BC will provide training for two days. Subsequently, EPMD will be responsible for this activity during the weekdays and BC will be performing the task on weekends.

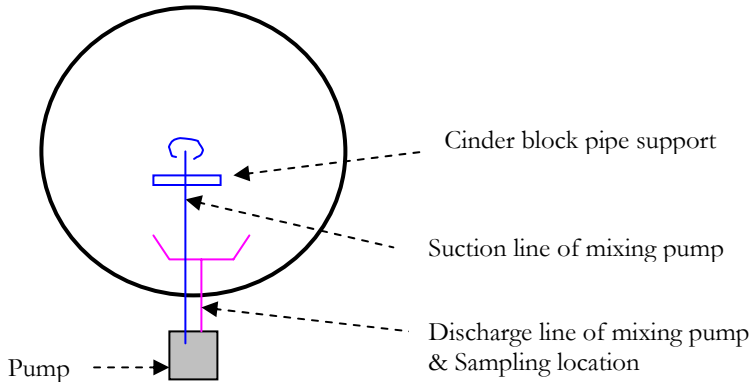


Figure 3. Schematic of mixing system in backwash tank

Detailed instructions are provided in Exhibit G.

C. OCCASIONAL SAMPLING AND MONITORING

The following activities will be performed occasionally during the pilot test study. The frequency of these tests is shown in Table 1.

1. Settleability Test

Two times per week, additional backwash samples will be taken to perform the settleability test. This will consist of pouring a 1-L backwash sample into an Imhoff Cone and recording the time and location of the Clearwater and solids interface. An SVI value will eventually be derived per the methodology described in Exhibit H. Log sheets to record readings are also provided in Exhibit H.

The EPMD/BC sampling crew assigned for that day will perform this analysis.

2. Measurement of Biomass

TSS and VSS will be measured in both Biostyr and Biofor units once every other week during the study before and after backwashing at more that one elevation. Standard operating procedure for biomass media sampling and analysis is given in Exhibit I.

The BC team will coordinate with the PLWTP Lab to perform this analysis.

3. Sampling and Monitoring of Diurnal CBOD

On two occasions, autosamplers will be used to collect 2-hr time-based composites to determine the diurnal CBOD profile of the influent and effluent streams. The BAF influent flow rate will remain constant during the period of diurnal CBOD testing.

On one of these occasions, the collected sample will be analyzed both for CBOD and Soluble CBOD (SCBOD). This extra sampling for monitoring diurnal CBOD will be performed concurrent with the normal sampling event (described in V.A.1 above). Non-refrigerated autosamplers cooled with ice packs will be used to collect the normal (V.A.1) daily samples. The refrigerated autosamplers will be retrofitted to allow

collection of 2-hour time-based composites. The following steps are required when converting the autosampler from one bottle to 24-bottle sampling:

1. Remove bottle rack from refrigerator.
2. Install distributor arm from top of refrigerator compartment.
3. Place 24 bottles in refrigerator.
4. Route pump tubing into top of one bottle.
5. Reprogram sampler to "multiplex mode".

The PLWTP Operations and Process Control Staff will be responsible for this task with assistance from BC.

4. Continuous Turbidity Reading During Stress Testing

Turbidity of the effluent streams of the Biostyr, Biofor-C and Biofor-N pilot units will be measured continuously two times during stress testing period, which is the last week of the Phase I. Turbidity meter with a data logger will be used for this purpose.

The continuous turbidity meter will also be cycled through the different BAF pilot units to track effluent turbidity continuously. The location of the meter will be tracked using the log sheets in Exhibit J.

The BC/EPMD team will conduct this testing and monitoring.

5. Collimated Beam Testing

To meet future standards, it maybe necessary to disinfect the secondary effluent produced by the full-scale BAF units. Disinfection using ultraviolet light is desirable because of its reduced hazards and absence of unpleasant byproducts.

The secondary effluent from the BAF pilot units will be tested to determine the UV dosage needed to inactivate bacteria and viruses present. Two collimated beam testing will be performed on the effluent streams of the Biostyr, Biofor-C and Biofor-N pilot units for the whole study.

BC will conduct the sampling for this analysis. A contract laboratory will perform this analysis.

6. MS2 Bacteriophage Testing

Once PLWTP convert to secondary treatment, bioassay testing on the effluent will likely be required. Therefore, a limited bioassay will be performed during the study. MS2 Bacteriophage testing will be performed two times on influents and effluents of the Biostyr, Biofor-C and Biofor-N pilot units.

BC will conduct the sampling for this analysis. A contract laboratory will perform this analysis.

7. Bioassay

Ultimately, the effluent from the PLWTP must pass the toxicity requirements for discharge to the Pacific Ocean. On two occasions, the BAF effluent will be tested for toxicity using the same organisms currently used by the City to determine the toxicity of the advanced primary effluent currently being discharged.

BC will conduct the sampling for this analysis. The City will perform the bioassay.

8. Assessment of Oxygen Transfer Efficiency

Oxygen transfer efficiency will be assessed in both Biofor and Biostyr BAFs. Off-gas testing protocols will be followed according to ASCE Guidelines on Oxygen Transfer Testing in Process Water. They will be conducted by Professor Mike Stenstorm of UCLA over a two day period during this phase (Phase 1) of the study only.

D. ADDITIONAL DATA (Normal PLWTP Monitoring Program for NPDES Permit)

The City currently monitors the advance primary effluent from the existing plant to satisfy its NPDES permit. The sampling crew will collect from the City laboratory data on the following parameters:

Total and volatile solids (bi weekly)
Total and dissolved sulfides
Conductivity
Alkalinity
Total hardness
Calcium hardness
Magnesium hardness
Sulfate
Phosphate
Heavy Metals (weekly)

Information on these parameters will be used to compare advance primary effluent data with similar data for the influent to the pilot plant and possibly explain any anomalies or oddities that may be observed during the course of the test.

VI. OPERATION AND MAINTENANCE

ODI and US Filter will be conducting training sessions for the City and BC personnel responsible for the operation of the pilot test facility. They will be providing O&M manuals, which will be placed in a covered container at the pilot test site. A sample O&M manual for the BIOFOR and BIOSTYR units are included in this protocol as Exhibit K.

Changes in operating parameters will be performed by the appropriate BC and City personnel after consultation with the respective vendors. Changes to the testing program will be performed only after discussing the previous data results and project goals and directions

amongst the City and BC team. This discussion is anticipated to occur during the monthly meetings (see Section IX for more details).

BC and City staff will not operate any of the instrumentation and controls (I&C) system of the pilot test units unless the respective vendor provides written authorization to do so and provides a release in liability from damages that may result from the operation of the I&C system.

Vendors will be given the opportunity to visit the pilot test site to conduct maintenance on their equipment. Based on preliminary discussions with the vendors, US Filter has indicated that it will send a representative monthly to inspect their unit. ODI has elected to visit only when necessary.

The proposed operating conditions for the BAF units during start up, wet weather and design conditions are presented in Tables 2, 3 and 4. During start up, the units will be first loaded at the minimum hydraulic loading rates proposed. Within three weeks, loading rates will be gradually increased to the average operating conditions. During the wet weather condition simulation, peak hydraulic, BOD and TSS loading rates proposed by the vendors will be simulated. Each BAF unit has different operational limits that are reflected by the proposed operating conditions shown in the Tables 2, 3 and 4. For example, BIOSTYR is limited by the peak hydraulic loading rate of 3.2 gpm/sf when one cell is in backwash for each battery. The corresponding BOD loading rate under this condition is 321 lb /1000 cf-d (based on the maximum monthly BOD concentration of 116 mg/L). By contrast, the limiting condition for the BIOFOR units is the BOD loading on Biofor-N unit (187 lb /1000 cf-d with a corresponding hydraulic loading rate of 2.82 gpm/sf).

Table 2. Proposed Operating Conditions for BIOSTYR

	Flow Rate (gpm)	Hydraulic Loading Rate (gpm/sf)	TSS Loading (lb /1000 cf-d)	BOD Loading (lb /1000 cf-d)	Process air (scfm)
Stage 1- Start up (acclimation period) – Jan 26 to Feb 22					
Stage 2- Simulation of wet weather conditions					
Week 1: Feb 23- Feb 29	8.9	2.4	100	241	2.0
Week 2: Mar 1-Mar 7	9.6	2.6	109	261	2.2
Week 3: Mar 8-Mar 14	10.3	2.8	117	281	2.3
Week 4: Mar 15-Mar 21	11.1	3.0	125	301	2.5
Week 5: Mar 22-Mar 28	11.8	3.2	134	321	2.6
Stage 3- Simulation of average design conditions					
Weeks 6-13: Mar 29-May 21	7.4	2	84	201	1.7
Stage 4- Stress test					
Week 14: May 22-May 30	The rates will be determined in the field				

Table 3. Proposed Operating Conditions for BIOFOR C

	Flow Rate (gpm)	Hydraulic Loading Rate (gpm/sf)	TSS Loading (lb /1000 cf-d)	BOD Loading (lb /1000 cf-d)	Process air (scfm)
Stage 1- Start up (acclimation period) – Jan 26 to Feb 22					
Stage 2- Simulation of wet weather conditions					
Week 1: Feb 23- Feb 29	7.38	2.35	93.3	224	1.66
Week 2: Mar 1-Mar 7	7.70	2.45	97.3	233.4	1.73
Week 3: Mar 8-Mar 14	8.17	2.60	103.2	247.7	1.84

	Flow Rate (gpm)	Hydraulic Loading Rate (gpm/sf)	TSS Loading (lb /1000 cf-d)	BOD Loading (lb /1000 cf-d)	Process air (scfm)
Week 4: Mar 15-Mar 21	8.48	2.70	107.2	257.3	1.91
Week 5: Mar 22-Mar 28	8.84	2.82	112	269	1.99
Stage 3- Simulation of average design conditions					
Weeks 6-13: Mar 29-May 21	6.30	2	79	191	1.41
Stage 4- Stress test					
Week 14: May 22-May 30	The rates will be determined in the field				

Table 4. Proposed Operating Conditions for BIOFOR N

	Flow Rate (gpm)	Hydraulic Loading Rate (gpm/sf)	TSS Loading (lb /1000 cf-d)	BOD Loading (lb /1000 cf-d)	Process air (scfm)
Stage 1- Start up (acclimation period) – Jan 26 to Feb 22					
Stage 2- Simulation of wet weather conditions					
Week 1: Feb 23- Feb 29	7.38	4.18	41.1	83.4	>0.5
Week 2: Mar 1-Mar 7	7.70	4.35	43.2	88.2	>0.5
Week 3: Mar 8-Mar 14	8.17	4.62	46.5	96.0	>0.5
Week 4: Mar 15-Mar 21	8.48	4.80	48.7	101	>0.5
Week 5: Mar 22-Mar 28	8.84	5.00	51.2	107.6	>0.5
Stage 3- Simulation of average design conditions					
Weeks 6-13: Mar 29-May 21	6.30	3.58	34.1	67.0	>0.5
Stage 4- Stress test					
Week 14: May 22-May 30	The rates will be determined in the field				

According to the vendors' proposals, there are multiple options for backwash sequence for each unit. Each option will be evaluated during the pilot test and the appropriate backwash sequence will be decided at the end of the study. The expected backwash air requirements for each BAF unit are shown in Table 5.

Table 5. Backwash air supplied to the units

Unit	Backwash air (scfm)
Biofor-C	16.8
Biofor-N	9.5
Biostyr	3.13

VII. HEALTH AND SAFETY

A copy of Brown and Caldwell's Health and Safety Plan (BCHSP) is attached as Exhibit L. All Brown and Caldwell staff shall strictly follow the guidelines provided in the BCHSP.

The City is responsible for its own H&S protocol.

VIII. EMERGENCY

All personnel working at the PLWTP on the pilot test site will abide by the contingency and emergency procedures contained in the November 19, 2003 version of the PLWWTP

Contingency Plan (Exhibit M). All personnel will be familiar with the plan prior to the start of any activity. A copy of the plan will be always available at the pilot test site.

During an emergency, the following people shall be contacted in the order provided:

City

Engineering

1. Pete Wong
   Work: (858) 292-6475
   Cell: (619) 980-5296
2. Amer Barhoumi
   Work: (858) 292-6421
   Cell: (619) 922-6421
3. Jerry Williams
   Work: (619) 221-8746
   Cell: (619)980-8047

Operations

1. Royal Manaka
   Facility : 221-8740
   Home or 24 hr.: (619) 588-4241
2. For all others, see Emergency Notification Phone Roster, pg 7 of Exhibit I.

Brown and Caldwell

1. Victor Occiano
   Work: (858) 571-6715
   Cell: (619) 203-3077
2. Joshua Newman
   Work: (858) 571-6763
   Cell: (619) 948-7779
3. Ray Fakhoury
   Work: (858) 571-6712

IX. MONTHLY REPORTS

At the end of each month, Brown and Caldwell will generate a summary of the data collected for that month. Monthly reports will include influent and effluent characterization data, flows, loading rates, operating conditions, copies of logbook entries, and analysis results of the monthly testing with highlighting events critical to the evaluation. ODI and US Filter will also receive a copy of their respective data to facilitate discussions regarding the performance of their respective pilot units. Data will be transferred to the vendors weekly.

Decision-making during the pilot testing shall occur during a monthly meeting with the project team to establish direction. Attendees will include Brown and Caldwell, City and

possibly the vendors. The focus will be adjusting future test conditions based on current results. The operation of the pilot test units may be altered if the monthly data shows particular operating condition must be evaluated further. Monthly meetings will be held alternatively between MOC2 and PLWTP.

The PLWTP/City Lab shall provide Brown and Caldwell with weekly reports in Excel format of parameters analyzed up to the date of the report. The information shall be transmitted via e-mail to the following addresses:

Victor Occiano: vocciano@brwncald.com
Joshua Newman: jnewman@brwncald.com

X. ROLES AND RESPONSIBILITIES

The pilot study will involve coordination between Brown and Caldwell and several City department and staff. The proposed roles and responsibilities of key members of the pilot test team are shown below.

City Management

Name	Role	Responsibility
Richard Mendes	Utilities General Manager	Overall project direction and City Council liaison
Scott Tulloch	Director, Metropolitan Wastewater Dept.	Project direction and liaison with City Manager's Office
Alan Langworthy	Deputy Director, Environmental Monitoring and Technical Services Division	Provide overall project direction Update Council on progress of Pilot Test
Ann Sasaki	Deputy Director, Deputy Director Engineering and Program Management Division	Project Direction – Engineering and Program Management
Bill Hanley	Deputy Director, Services and Contracts Section	Project Contracts Administration
Lori Vereker	Deputy Director, Operations and Maintenance Division	Project Direction – Operation and Maintenance
Allen Holden	Assistant Deputy Director, Engineering and Program Management Division	Assist Ann Sasaki on project related issues
Jesse Pagliaro	Assistant Deputy Director, Operation and Maintenance Division	Assist Lori Vereker on project related issues
Joe Cordova	PLWTP Superintendent	Provide technical assistance on operation and maintenance issues relating to the existing PLWTP One of two primary contact during emergencies at PLWTP
Pete Wong	Sr. Project Engineer	Provide detailed project direction
Jerry Williams	Sr. Plant Engineer	Provide technical assistance on engineering issues relating to existing the PLWTP One of two primary contact during emergencies at PLWTP
Jim Wageman	Senior Civil Engineer	Provide technical assistance on engineering issues relating to existing the PLWTP

Name	Role	Responsibility
Amer Barhoumi	Project Manager	Oversee City sampling personnel and sampling activities Track project budget Recipient of monthly data from BC Distribution of monthly data to City personnel Schedule and facilitate project meetings Primary contact during emergencies occurring during off work hours and weekends
Rey Sacro	Assistant PM	Assist Amer Barhoumi
Richard Snow	Assistant Construction Manager	Construction and PLWTP related issues

City – Pilot Plant Operation, Sampling/Monitoring and Sample Analysis

Name	Role	Responsibility
Steve Suhendra	Project Engineer	Grab sample collection Imhoff Cone – Settleability Analysis Daily observations Daily records Inspection of pilot test units and appurtenances Pressure Sensor Datalogger Dowload City Site Safety Co-Coordinator Delivery of TKN samples to NCWRP Lab every Monday
Monika Smoczynski	Project Engineer	Grab sample collection Imhoff Cone – Settleability Analysis Daily observations Daily records Inspection of pilot test units and appurtenances Pressure Sensor Datalogger Dowload City Site Safety Co-Coordinator Delivery of TKN samples to NCWRP Lab every Monday
Jim Lindsay	Shift Sr. Process Control Supervisor	Operations and PLWTP Health and Safety
Brent Bowman	PLWTP Associate Chemist	Supervise analysis of samples collected from the pilot test facility
Steve Meyer	Associate Chemist	QA/QC of analytical data Distribution of analytical data to City and Brown and Caldwell staff Data management and data support

Brown and Caldwell Management

Name	Role	Responsibility
George Khoury	Principal In Charge	Project Direction Client Liaison Contract Administrations
Henryk Melcer, PhD	Sr. Technical Advisor	Provide advice on process-related issues QA/QC
Denny Parker, PhD	Sr. Technical Advisor	Provide advice on process-related issues QA/QC
Mike Anderson	Sr. Project Advisor	Provide advice on mechanical-related issues QA/QC
Victor Occiano	Project Manager	Supervise BC Team (Project Engineers and Assistant Project Engineers) Liaison between BC, City staff and Vendor staff Administration of Contract with Vendor and City QA/QC and submittal of summary reports to City Attendance to update monthly meetings Develop Site Safety Plan
Joshua Newman	Project Engineer	Primary person responsible for the day-to-day operation of the BAF units Supervise BC sampling crew Develop monthly summary reports Attendance to update monthly meetings

Brown and Caldwell Pilot Plant Operations, Sampling and Monitoring

Name	Role	Responsibility
Nick Boswell	Assistant Project Engineer	Autosampler setup Delivery of composite samples to PLWTP Lab Completion and submittal of sample manifest to PLWTP Lab Grab sample collection Imhoff Cone – Settleability Analysis Daily observations Daily records Inspection of pilot test units and appurtenances Data compilation Site Safety Coordinator Weekend sampling and monitoring

Name	Role	Responsibility
Seval Sen	Assistant Project Engineer	Autosampler setup Delivery of composite samples to PLWTP Lab Completion and submittal of sample manifest to PLWTP Lab Grab sample collection Imhoff Cone – Settleability Analysis Daily observations Daily records Inspection of pilot test units and appurtenances Data compilation Weekend sampling
Anil Pai	Assistant Project Engineer	Autosampler setup Delivery of composite samples to PLWTP Lab Completion and submittal of sample manifest to PLWTP Lab Grab sample collection Imhoff Cone – Settleability Analysis Daily observations Daily records Inspection of pilot test units and appurtenances Data compilation Weekend sampling

EXHIBITS

A Pilot Test Facility Design Drawings

B Pilot Test Unit Specifications

C Sample of Chain-of-Custody Record

D Composite Sampling Instructions

E Daily Pilot Test Meter and Instrumentation Readings Log Sheets

F Pressure Transducer Data Download Instructions

G Backwash Sampling Instructions

H SVI Methodology and Log Sheets

I Standard Operating Procedure for Biomass Media Sampling and Analysis

J Continuous Turbidimeter Log Sheet

K BAF O&M Manual

L Brown and Caldwell Health and Safety Plan

M PLWWTP Contingency Plan (November 19, 2003 Version)

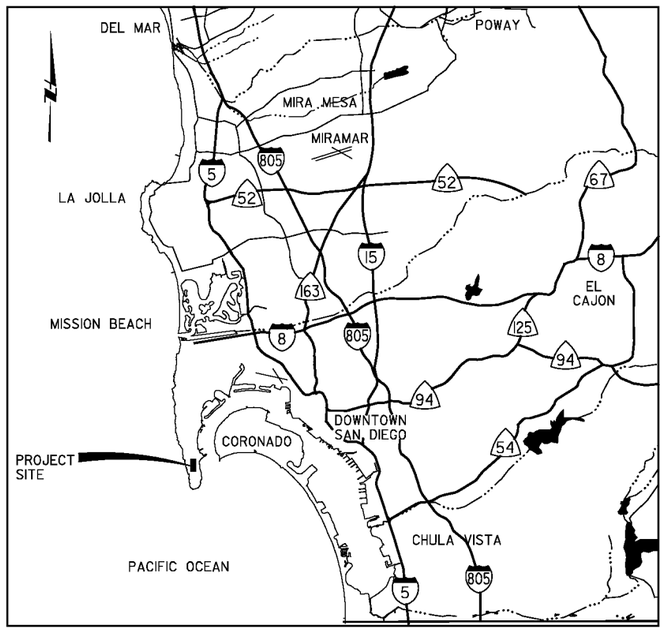
EXHIBIT A

PILOT TEST FACILITY DESIGN DRAWINGS

CONTRACT DRAWINGS FOR

METROPOLITAN WASTEWATER DEPARTMENT

City of San Diego

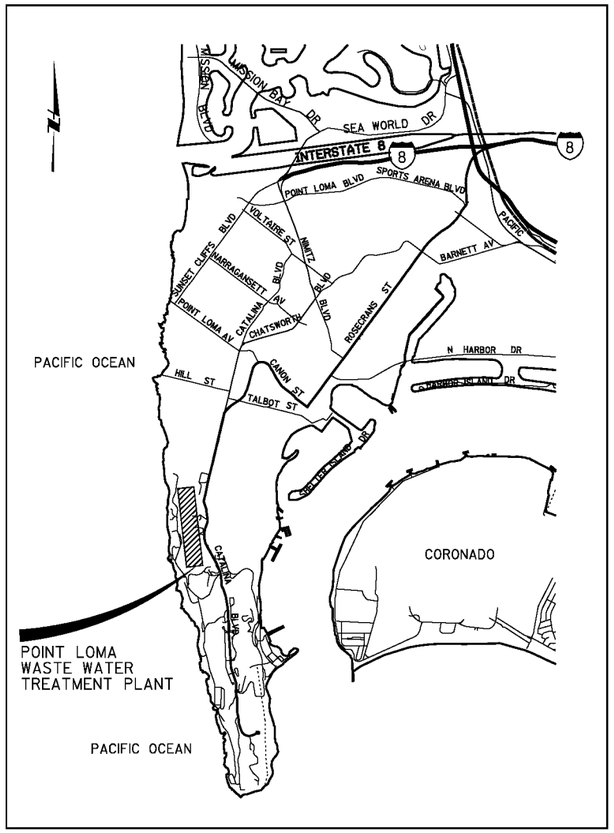


VICINITY MAP

POINT LOMA WASTEWATER TREATMENT PLANT BIOLOGICAL AERATED FILTER PILOT STUDY

VOLUME 1 – DRAWINGS

NOVEMBER 2003



LOCATION MAP

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2/14/2005

DRAWING NO.	CS-01
SHEET NO.	1

POINT LOMA WASTE WATER TREATMENT PLANT
BIOLOGICAL AERATED FILTER PILOT STUDY

COVER SHEET

FOR THE CITY OF SAN DIEGO
METROPOLITAN WASTEWATER DEPARTMENT

MWWD DIRECTOR _____ DATE _____

CITY OF SAN DIEGO, CALIFORNIA
SHEET 1 OF 22 SHEETS

WATER W.O. NA
SEWER W.O. NA

PROJECT MANAGER _____ DATE _____

DESIGN ENGINEER

CONTROL CERTIFICATION

188-1692
LAMBERT COORDINATES

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

00000- 01 -D

DRAWING STATUS

NO.	DATE	REQ.	REVISION DESCRIPTION	DRAWN	CKD	APD	PE	EM	QA/QC

DESCRIPTION	BY	APPROVED	DATE	FILMED

REGISTERED PROFESSIONAL ENGINEER
ROSALIA A. NEWMAN
No. 64115
Exp. _____
CIVIL
STATE OF CALIFORNIA

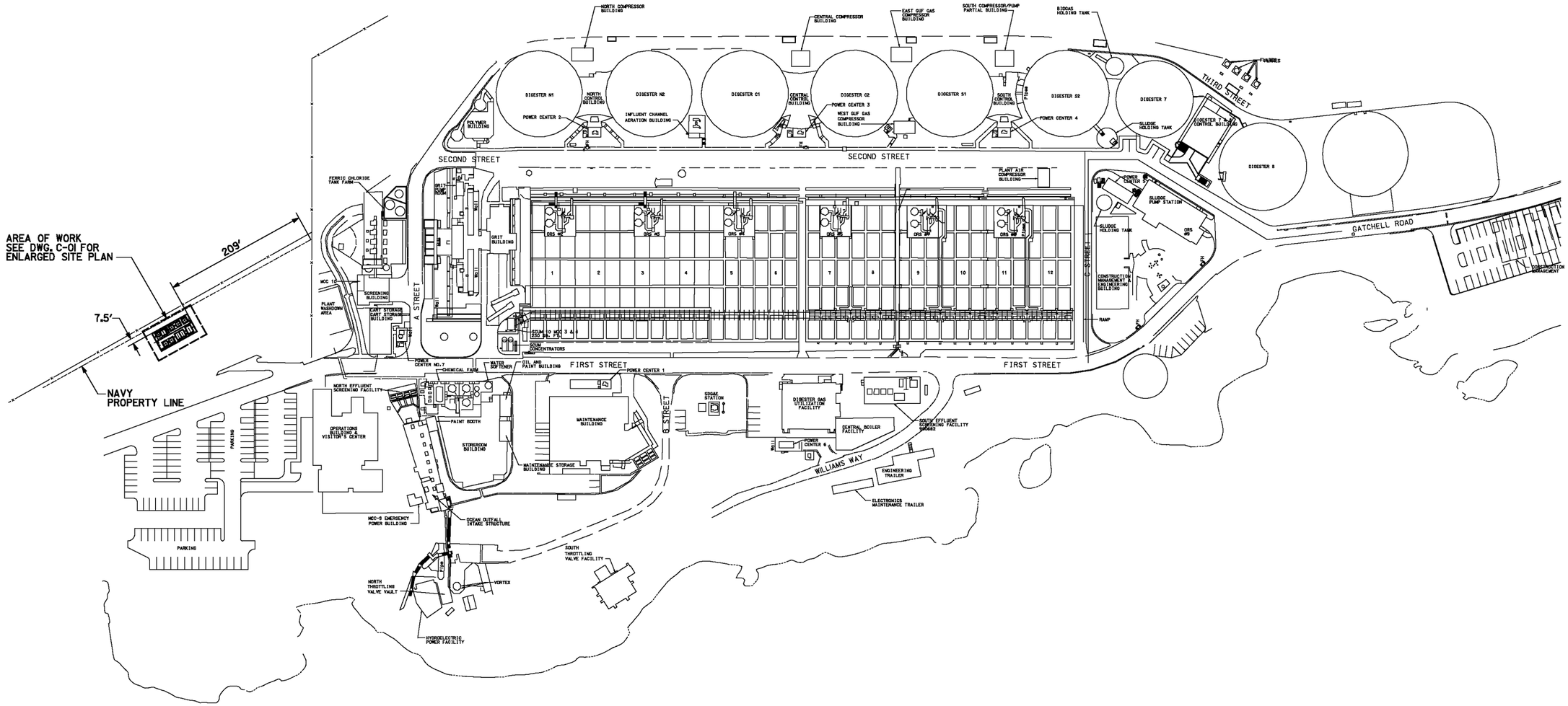
WARNING
0 ½ 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

BROWN AND CALDWELL

SUBMITTED: _____ DATE: _____
PROJECT MANAGER
APPROVED: _____ DATE: _____
BROWN AND CALDWELL
APPROVED: _____ DATE: _____

SCALE
HORIZONTAL NONE
VERTICAL NONE

METROPOLITAN WASTEWATER DEPARTMENT
City of San Diego



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2/4/2005

REGISTERED PROFESSIONAL ENGINEER
JOSHUA A. NEWMAN
No. 64115
Exp. _____
CIVIL
STATE OF CALIFORNIA

WARNING
0 ½ 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

BROWN AND CALDWELL

SUBMITTED: _____ DATE: _____
PROJECT MANAGER
APPROVED: _____ DATE: _____
BROWN AND CALDWELL
APPROVED: _____ DATE: _____

SCALE — HORIZONTAL 1" = 80'
VERTICAL NONE

METROPOLITAN WASTEWATER DEPARTMENT
City of San Diego

DRAWING STATUS

NO.	DATE	REQ.	REVISION DESCRIPTION	DRAWN	CKD	APD	PE	EM	QA/QC

DRAWING NO. G-01
SHEET NO. 2

POINT LOMA WASTE WATER TREATMENT PLANT
BIOLOGICAL AERATED FILTER PILOT STUDY

OVERALL SITE PLAN

CITY OF SAN DIEGO, CALIFORNIA
SHEET 2 OF 22 SHEETS

WATER W.O. NA
SEWER W.O. NA

PROJECT MANAGER _____ DATE _____

DESCRIPTION	BY	APPROVED	DATE	FILMED

DESIGN ENGINEER

CONTROL CERTIFICATION
188-1692
LAMBERT COORDINATES

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

00000-02-D

GENERAL NOTES

TRAFFIC REQUIREMENTS:
STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 1988 EDITION, SECTION 7-10.1 THROUGH 7-10.4

STANDARD SPECIFICATIONS:

DOC NO	FILED	DESCRIPTION
769845	07-21-00	STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 1991 EDITION, INCLUDING THE 1991 REGIONAL AND THE 1991 CITY OF SAN DIEGO SUPPLEMENTAL AMENDMENTS
749843	01-24-00	CALIFORNIA DEPARTMENT OF TRANSPORTATION, MANUAL OF TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTENANCE WORK ZONES, DATED 1985

STANDARD DRAWINGS:

DOC NO	FILED	DESCRIPTION
769846	07-21-00	CITY OF SAN DIEGO STANDARD DRAWINGS

UNDERGROUND UTILITIES:
FILANC SHALL NOTIFY THE FOLLOWING AGENCIES PRIOR TO THE START OF WORK, PHONE THE TELEPHONE AND THE GAS AND ELECTRIC COMPANY AND OTHER UTILITY COMPANIES AND REQUEST THAT THEIR UNDERGROUND UTILITIES BE MARKED OUT. THIS REQUEST SHALL BE MADE BY THE FILANC PRIOR TO ALL TRENCHING OPERATIONS REGARDLESS OF WHETHER THE PLANS SHOW UNDERGROUND TELEPHONE OR GAS AND ELECTRIC DUCTS, CABLES, OR PIPELINES.

SAN DIEGO GAS AND ELECTRIC	ELECTRIC	(858) 654-8686
	GAS	(858) 547-2020
PACIFIC BELL TELEPHONE CO.	FAX	(619) 296-1940
AT&T		(858) 848-0070
CITY BUILDINGS DIVISION		(619) 236-5500
WATER & SEWER		(619) 236-5650
STREET LIGHTING SYSTEMS		(619) 236-5310
TIME WARNER CABLE TV		(858) 635-8783
COX CABLE TV		(619) 266-5598
TELE COMMUNICATIONS (FIBER OPTIC)		((858) 547-2007
NEO CORP. (JIM VOLMER)		(858) 895-9899
U.S. NAVY (JEFF BOWEN, NETWORK ENGINEER)		(619) 553-6354

DATUM: MEAN SEA LEVEL

INDEX OF DISCIPLINES:

G GENERAL
C CIVIL
S STRUCTURAL
M MECHANICAL
E ELECTRICAL

UTILITY REFERENCE DRAWINGS

CITY OF SAN DIEGO

19309-D	WEST POINT LOMA INTERCEPTOR SEWER
23614-D	POINT LOMA WASTEWATER TREATMENT PLANT SEDIMENTATION BASINS 9 & 10, INFLUENT-EFFLUENT CHANNEL MODIFICATIONS, WEIR BUILDING DEMOLITION
25701-D	12" SLUDGE FORCE MAIN POINT LOMA WWTP-SUNSET CLIFFS BRIDGE
27910-D	NORTH SHORELINE PROTECTION IMPROVEMENTS
31673-D	POINT LOMA WASTEWATER TREATMENT PLANT GRIT PROCESSING IMPROVEMENTS

GENERAL PROJECT NOTES

1. NEITHER THE OWNER, NOR THE ENGINEER OF WORK WILL ENFORCE SAFETY MEASURES OR REGULATIONS. FILANC SHALL DESIGN, CONSTRUCT AND MAINTAIN ALL SAFETY DEVICES AND SHALL BE SOLELY RESPONSIBLE FOR CONFORMING TO ALL LOCAL, STATE, AND FEDERAL SAFETY AND HEALTH STANDARDS, LAWS AND REGULATIONS.
2. FILANC AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT FILANC SHALL DEFEND, INDEMNIFY, AND HOLD THE CITY AND THE ENGINEER OF WORK HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE CITY OR THE ENGINEER.
3. ACCESS AND WORK HOURS AT THE SITE SHALL BE LIMITED TO THE HOURS OF 7:00 A.M. TO 3:30 P.M. ALTERNATIVE WORK HOURS REQUIRES PRIOR APPROVAL OF OWNER.
4. UPON COMPLETION OF EACH DAY'S WORK, FILANC SHALL BE RESPONSIBLE FOR LEAVING THE WORK AREA FREE OF HAZARDS AND SHALL PROVIDE NECESSARY TEMPORARY SIGNS, WARNING DEVICES AND BARRICADES. TEMPORARY STEEL COVER PLATES OVER TRENCHES AT THE END OF EACH DAY ARE REQUIRED.
5. FILANC SHALL PROTECT EXISTING FACILITIES IN PLACE AND NOT INTERRUPT EXISTING FACILITIES OPERATION. EXISTING FACILITIES SHALL REMAIN OPERATIONAL AT ALL TIMES EXCEPT FOR SHUT-DOWNS AS RELATED TO THE WORK. ANY FACILITIES DAMAGED SHALL BE REPAIRED OR REPLACED IN KIND AS APPROVED BY THE OWNER AND AT NO COST TO THE OWNER.
6. FILANC SHALL FIELD VERIFY ALL DRAWING DIMENSIONS AND THOSE TAKEN FROM RECORD DRAWINGS. FILANC SHALL VERIFY ALL CONDITIONS AT THE SITE AND CROSS CHECK DETAILS AND DIMENSIONS SHOWN ON ALL DRAWINGS HEREIN AND EQUIPMENT SHOP DRAWINGS. FLOOR AND WALL OPENINGS, AND FRAMING, VARIATIONS IN SLAB ELEVATIONS AND OTHER CIVIL, STRUCTURAL, MECHANICAL, OR ELECTRICAL REQUIREMENTS MUST BE COORDINATED BEFORE FILANC PROCEEDS WITH CONSTRUCTION. BROWN AND CALDWELL'S FIELD ENGINEER MUST BE NOTIFIED OF ANY DISCREPANCIES OR INCONSISTENCIES PRIOR TO ANY FABRICATION.
7. FILANC SHALL FIELD VERIFY DIMENSIONS WITH ACTUAL FABRICATED EQUIPMENT DELIVERED TO THE PROJECT OR AS-BUILT CONDITIONS. FILANC SHALL ALLOW FOR ADJUSTMENTS TO CONNECTIONS TO EQUIPMENT DUE TO FABRICATION TOLERANCES AND INSTALLATION TOLERANCES.
8. WORKING DIMENSIONS SHALL NOT BE SCALED FROM PLANS, SECTIONS, OR DETAILS FROM DRAWINGS CONTAINED HEREIN.
9. THE PRECISE DIMENSIONS AND LOCATIONS OF EQUIPMENT SHALL BE DETERMINED FROM STRUCTURAL, CIVIL, MECHANICAL AND ELECTRICAL, OR SIMILAR REQUIREMENTS FOR THE ACTUAL EQUIPMENT BEING FURNISHED. SHOP DRAWINGS WITH ADEQUATE ACCURATE DIMENSIONS MUST BE SUBMITTED AND REVIEWED PRIOR TO FILANC INSTALLING PLATFORMS, HOISTS AND DUCTS, AND MAKING ELECTRICAL CONNECTIONS AFFECTED BY SAID EQUIPMENT.
10. FILANC SHALL REVIEW WITH THE OWNER ALL SCHEDULED PLANT OPERATIONS AND WORK TO BE DONE BY OTHERS THAT COULD IMPACT WORK DEFINED IN THESE CONTRACT DOCUMENTS. THE WORK DEFINED HEREIN SHALL BE EXECUTED IN A MANNER THAT DOES NOT INTERFERE WITH SCHEDULED OPERATIONS OR WORK PERFORMED BY OTHERS.
11. FILANC TO CONTACT JIM VOLMER OF NEO CORP. AT (858) 895-9899 BEFORE EXCAVATING WITHIN 4 FT OF EXISTING LANDFILL GAS PIPELINE (LFG). FILANC TO PROVIDE SHORING PLAN FOR EXCAVATION.
12. FILANC SHALL SUBMIT (PRIOR TO COMMENCEMENT OF WORK) A HEALTH AND SAFETY PLAN.
13. THE CITY WILL SUSPEND OR CANCEL CONSTRUCTION OPERATIONS ANYTIME A SAFETY VIOLATION OR OPERATIONAL PROBLEMS ARE OBSERVED ON THE SITE.
14. WASTES SHALL NOT BE A CAUSE OF LITTER AND BE CONTROLLED TO PREVENT INJURY TO THE PUBLIC OR PERSONNEL. CONTROLS SHALL PREVENT THE ACCUMULATION OR OFF-SITE MIGRATION OF LITTER IN QUANTITIES THAT CREATE A NUISANCE OR CAUSE OTHER PROBLEMS. LITTER SHALL BE PREVENTED FROM COMING INTO CONTACT WITH RAIN OR OTHER WATER SOURCES. EXCAVATED WASTES AT THE PROJECT SITE SHALL BE COVERED UNTIL THEY ARE REMOVED FOR PROPER DISPOSAL.

PROJECT DATA

CLIENT: CITY OF SAN DIEGO

SCOPE OF WORK:
1. CONSTRUCTION OF SLAB USED TO SUPPORT PILOT TEST UNITS.
2. ANCHORING OF PILOT TEST UNITS TO SLAB.
3. CONNECTION OF POWER FROM EXISTING MOTOR CONTROL ROOM TO PILOT TEST UNITS.

APN: 532-520-1200

OWNER:
CITY OF SAN DIEGO
METROPOLITAN WASTEWATER DEPARTMENT
9192 TOPAZ WAY
SAN DIEGO, CA 92123
(858) 654-4243 FAX (858) 654-4210

TYPE OF CONSTRUCTION: PUBLIC WORKS

OCCUPANCY: N/A

USES:
EXISTING: STAGING AREA
PROPOSED: TEMPORARY PILOT TEST LOCATION

SOIL CONDITIONS:
PRELIMINARY GEOTECHNICAL EVALUATION
BAF PILOT PLANT
POINT LOMA WASTEWATER TREATMENT PLANT
SAN DIEGO, CALIFORNIA
BY NINYO & MOORE, DATED NOVEMBER 12, 2003

PROJECT DIRECTORY

CLIENT:
MWWD CITY OF SAN DIEGO
AMER BARHOUMI - PROJECT MANAGER
9192 TOPAZ WAY
SAN DIEGO, CA 92123
(858) 292-6471 FAX (858) 654-4210

PRIME CONSULTANT:
BROWN AND CALDWELL
VICTOR OCCIANO - PROJECT MANAGER
9665 CHESAPEAKE DRIVE, SUITE 201
SAN DIEGO, CA 92123
(858) 514-8822 FAX (858) 514-8833

CONTRACTOR:
J.R. FILANC CONSTRUCTION COMPANY, INC.
DAVID KEISS
4616 NORTH AVE.
OCEANSIDE, CA 92056
(760) 941-7130 FAX (619) 941-3969

STRUCTURAL:
SIMON WONG ENGINEERING
SIMON WONG
9968 HIBERT STREET, SUITE 202
SAN DIEGO, CA 92131
(858) 566-3113 FAX (858) 566-6844

GEOTECHNICAL:
NINYO & MOORE
GREGORY FARRAND
5710 RUFFIN ROAD
SAN DIEGO, CA 92123
(858) 576-1000 FAX (858) 576-9600

LIST OF DRAWINGS

DRAWING NO. G-02
SHEET NO. 3

POINT LOMA WASTE WATER TREATMENT PLANT
BIOLOGICAL AERATED FILTER PILOT STUDY

GENERAL NOTES, SUMMARY OF WORK, AND SURVEY DATA

CITY OF SAN DIEGO, CALIFORNIA
SHEET 3 OF 22 SHEETS

WATER W.O. NA
SEWER W.O. NA

PROJECT MANAGER ____ DATE ____

DESCRIPTION	BY	APPROVED	DATE	FILMED

DESIGN ENGINEER
CONTROL CERTIFICATION
188-1692 LAMBERT COORDINATES
CONTRACTOR ____ DATE STARTED ____
INSPECTOR ____ DATE COMPLETED ____
00000-03-D

REGISTERED PROFESSIONAL ENGINEER — JOSHUA A. NEWMAN — No. 64115 — Exp. ____ — CIVIL — STATE OF CALIFORNIA

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

BROWN AND CALDWELL
SUBMITTED: ____ PROJECT MANAGER DATE: ____
APPROVED: ____ BROWN AND CALDWELL DATE: ____
APPROVED: ____ DATE: ____

SCALE — HORIZONTAL NONE — VERTICAL NONE

METROPOLITAN WASTEWATER DEPARTMENT
City of San Diego

DRAWING STATUS

NO.	DATE	REQ.	REVISION DESCRIPTION	DRAWN	CKD	APD	PE	EM	QA/QC

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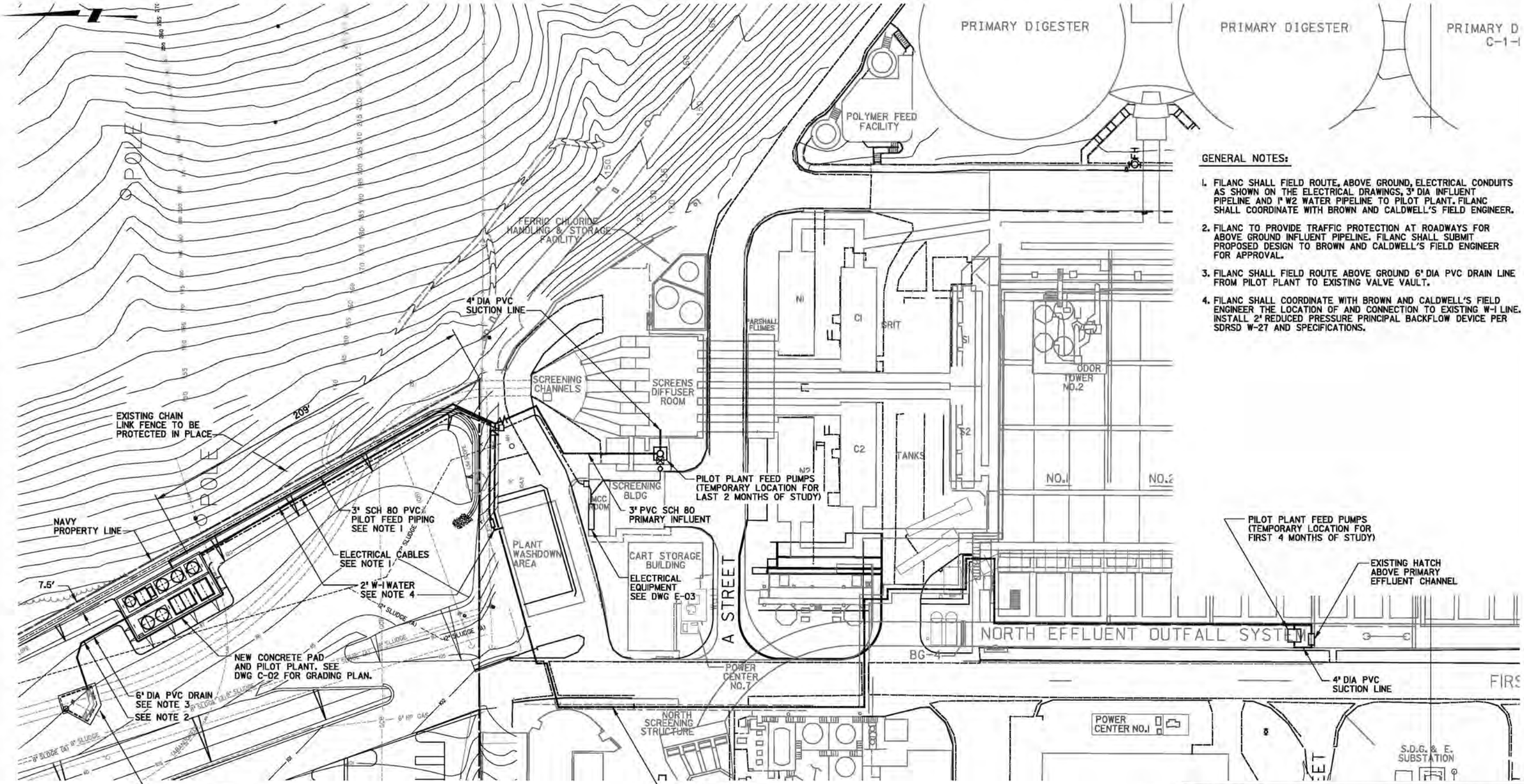
2/14/2005



GENERAL NOTES:

1. FILANC SHALL FIELD ROUTE, ABOVE GROUND, ELECTRICAL CONDUITS AS SHOWN ON THE ELECTRICAL DRAWINGS, 3" DIA INFLUENT PIPELINE AND 1" W2 WATER PIPELINE TO PILOT PLANT. FILANC SHALL COORDINATE WITH BROWN AND CALDWELL'S FIELD ENGINEER.
2. FILANC TO PROVIDE TRAFFIC PROTECTION AT ROADWAYS FOR ABOVE GROUND INFLUENT PIPELINE. FILANC SHALL SUBMIT PROPOSED DESIGN TO BROWN AND CALDWELL'S FIELD ENGINEER FOR APPROVAL.
3. FILANC SHALL FIELD ROUTE ABOVE GROUND 6" DIA PVC DRAIN LINE FROM PILOT PLANT TO EXISTING VALVE VAULT.
4. FILANC SHALL COORDINATE WITH BROWN AND CALDWELL'S FIELD ENGINEER THE LOCATION OF AND CONNECTION TO EXISTING W-1 LINE. INSTALL 2" REDUCED PRESSURE PRINCIPAL BACKFLOW DEVICE PER SDRSD W-27 AND SPECIFICATIONS.

DRAWING NO. C-01
SHEET NO. 4

POINT LOMA WASTE WATER TREATMENT PLANT
BIOLOGICAL AERATED FILTER PILOT STUDY

CIVIL SITE PLAN

CITY OF SAN DIEGO, CALIFORNIA
SHEET 4 OF 22 SHEETS

WATER W.O. NA
SEWER W.O. NA

REGISTERED PROFESSIONAL ENGINEER JOSHUA A. NEWMAN No. 64115 Exp. CIVIL STATE OF CALIFORNIA

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

BROWN AND CALDWELL
SUBMITTED: PROJECT MANAGER DATE
APPROVED: BROWN AND CALDWELL DATE
APPROVED: DATE
SCALE HORIZONTAL 1" = 30'
VERTICAL NONE

METROPOLITAN WASTEWATER DEPARTMENT
City of San Diego

DRAWING STATUS

NO.	DATE	REQ.	REVISION DESCRIPTION	DRAWN	CKD	APD	PE	EM	QA/QC

PROJECT MANAGER DATE

DESCRIPTION	BY	APPROVED	DATE	FILMED

CONTRACTOR DATE STARTED
INSPECTOR DATE COMPLETED

DESIGN ENGINEER
CONTROL CERTIFICATION
188-1692 LAMBERT COORDINATES
00000-04-D

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2/14/2005