WATCHTOWER
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WASTEWATER SYSTEM ENGINEERING REPORT
WATCHTOWER EDUCATIONAL CENTER
AMENDED SITE PLAN

July 8, 2009

Prepared by Joseph Dodd, P.E.

This report gives a brief description of the existing wastewater system for the Watchtower Educational Center to provide background material to the Draft Environmental Impact Statement. It focuses on the changes in flows and loads resulting from the Watchtower Bible and Tract Society Amended Site Plan and the ability of the present Wastewater Treatment Facility (WWTF) to meet these changes without the need for an upgrade of the WWTF itself.

Existing Wastewater System

The Applicant's WWTF treats domestic sewage emanating from an educational center, which includes classrooms, dormitories, dining rooms, offices, and support operations. The present average daily flow is about 96,000 gpd, while the permitted flow is 165,000 gpd. A plan and schematic flow diagram of the WWTF are shown on Figures 1 and 2, respectively.

The WWTF uses the single-stage nitrification mode of the activated sludge process, as described in the DEIS, Chapter 6, "Water Supply and Utilities." The WWTF was initially constructed in 1989 to 1991, and has undergone an upgrade from 1994 to 1995 to add primary clarification and more flow equalization, and again from 2001 to 2003 to meet the NYCDEP's Regulatory Upgrade Program. Aerobic sludge digestion and dewatering are carried out in the Mechanical Dewatering Facility constructed from 1997 to 2000. The plant discharges to Mountain Brook, a Class C intermittent stream, at a location within the Watchtower Educational Center (WEC) property. In over 17 years of operation, the plant has experienced only a few exceedances of the SPDES permit, and none within the past year.

The WWTF is regulated under SPDES Permit No. NY-0165778. Specific effluent criteria are as follows:

1. Flow = 0.165 MGD 30-day arithmetic mean.
2. CBOD = 5.0 mg/L maximum.
3. TSS = 10.0 mg/L maximum.
4. Fecal coliform = 30-day geometric mean not-to-exceed 200/100 ml.
5. pH = 6.5 to 8.5 su.
6. Settleable solids = 0.1 ml/L maximum.
7. Ammonia = 2 mg/L maximum (1.5 mg/L maximum; June 1 to October 31).
8. Dissolved oxygen = 7.0 mg/L minimum.
9. Phosphorus = 0.5 mg/L 30 day average.
10. Chlorine residual: 0.2 mg/L min. in contact tank; 0.1 mg/L max. in effluent.
11. Turbidity: 0.5 NTU 95% of monthly readings; 5.0 NTU maximum.
12. Giardia lamblia cysts: 99.9% removal; Enteric viruses 99.99% removal.

Projected Flows and Biochemical Oxygen Demand (BOD) Loadings for the WEC WWTF, Amended Site Plan

The BOD loading on the aeration tanks of the WWTF secondary treatment system is an important design parameter in sizing these tanks, as called for in paragraph 92.31 of *10 States Standards*. This loading is influenced not only by the influent BOD loading on the WWTF, but also by the BOD removal efficiency of the primary sedimentation tanks (clarifiers), and the flows and loads contributed by the sidestreams from other process areas, which are returned to the flow equalization tanks ahead of the primary clarifiers. Sidestreams include solids processing

return flows from digester decanting, sludge thickening, sludge pressing, tank wash down, and the dual sand filter backwash flow. The latter amounts to about 30,000 gpd, and is required to maintain filter performance. The best way to evaluate the above factors is by full scale testing based on flow measurements and sampling to provide BOD concentrations and loads for quantitative analyses.

In the past, only monthly Carbonaceous BOD (CBOD) samples of the WWTF influent and final effluent were taken, as required by the SPDES permit. (CBOD is called for in the SPDES permit in lieu of BOD to remove ammonia interference in determining organic load, but is equivalent to BOD in this usage except when considering nitrification as discussed later.) Therefore, there was no way to establish primary clarifier performance or the effect of sidestreams based on previously available data. To provide the needed information, a program of testing was carried out to measure weekly flow and CBOD values for the WWTF influent and primary effluent for the 20-week period from January 23 to June 11, 2008. This took advantage of the recent installation and calibration of the new ultrasonic level sensors with improved accuracy for the Parshall flume flow meters, for both the WWTF influent and primary effluent. A single primary clarifier was in operation during this period (without chemical enhancement), as has typically been the case since primary clarifier startup.

CBOD values were analyzed both in the Orange County Lab (OCL) (State certified) and the Applicant's lab, with the OCL results being used to determine loads except in one case where the OCL sample was lost. The measurements were taken at mid-week in each case, so the averages for flows and loads are somewhat higher than the monthly averages would have been, considering the lower weekend values. The SPDES limit on flow of 165,000 gpd is based on the 30-day arithmetic mean of WWTF daily influent flows. The design average BOD5 loading given in paragraph 92.31 of *10 States Standards* is the average organic load entering the aeration tank over a continuous 12-month period.

The results of the 20-week BOD testing period are given in Table 1. Of particular note is the average primary treatment BOD removal percentage of 43.7 percent, which includes the effects of sidestream flows and loads. Of further interest is the tendency toward increasing primary removal efficiency with increasing WWTF influent loads, as shown in the plot in Figure 3. Therefore, the average percent removal value should be conservative if applied to higher than average loadings.

For present purposes, and neglecting flow and load reductions based on possible conservation and recycling measures, an estimate of future BOD loadings may be made. For the population of 1,803 used in the DEIS, and taking the average population during the 20-week study as 1,147 (from Water Systems Operation Reports sent to PCDOH), the projected BOD load would be: $182.8 \times 1{,}803 \div 1{,}147 = 287.3$ lb/day. With the full aeration ring of both activated sludge units in operation (23,400 cf total), the BOD loading would be 12.3 lb BOD/1,000 cf. This compares with the allowable *10 States Standards* loading for single stage nitrification plants of 15 lb/1,000 cf. If the bed count of 2,050 is used instead of the population of 1,803 (as PCDOH has used in the past), the loading would increase to 14.0 lb/1,000 cf, still within the allowable value. The above midweek BOD loadings overstate the average monthly or yearly values called for in the permit, as discussed below for flows.

PATTERSON WWTF OPERATING DATA 20 WEEK BOD TESTING JAN. 28-JUN. 11, 2008 2/26/2009

		WWTF Influent				Primary Effluent					WWTF Effluent (Final)
Data Points	Date	Avg Daily WW Flow mil gal/day	OLC CBOD mg/l	WTL CBOD mg/l	CBOD* load lb/d	Avg Daily WW Flow mil. gal/d	OLC CBOD mg/l	WTL CBOD mg/l	CBOD* load lb/d	% Rem (Primary)	Avg Daily WW Flow mil gal/day
1	23-Jan	0.083	588	473	407.0	0.138	135	100	155.4	61.8	0.104
2	30-Jan	0.103	294		252.6	0.148	114		140.7	44.3	0.099
3	6-Feb	0.099	765	686	631.6	0.145	213	179	257.6	59.2	0.094
4	14-Feb	0.094	270	302	211.7	0.157	131	151	171.5	19.0	0.104
5	20-Feb	0.089	294	280	218.2	0.150	129	124	161.4	26.0	0.095
6	27-Feb	0.097	246	349	199.0	0.141	87	115	102.3	48.6	0.095
7	6-Mar	0.094	388	354	304.2	0.147	131	116	160.6	47.2	0.105
8	12-Mar	0.095	630	579	499.1	0.134	160	166	178.8	64.2	0.087
9	19-Mar	0.101	395	367	332.7	0.139	210	122	243.4	26.8	0.114
10	26-Mar	0.096	735	539	588.5	0.139	211	178	244.6	58.4	0.096
11	2-Apr	0.095	485	465	384.3	0.167	144	151	200.6	47.8	0.118
12	9-Apr	0.096	348	316	278.6	0.151	174	133	219.1	21.4	0.097
13	16-Apr	0.094	329	372	257.9	0.147	168	145	206.0	20.1	0.097
14	23-Apr	0.098	426	405	348.2	0.152	159	147	201.6	42.1	0.100
15	24-Apr	0.109	341	358	310.0	0.150	119	128	148.9	52.0	0.113
16	30-Apr	0.094	432	425	338.7	0.154	176	155	226.0	33.3	0.100
17	7-May	0.097	392	407	317.1	0.147	137	120	168.0	47.0	no data
18	14-May	0.097	414	357	334.9	0.150	181	106	226.4	32.4	0.100
19	21-May	0.091	318	362	241.3	0.147	119	128	145.9	39.6	0.094
20	28-May	0.101	a	411	346.2	0.134	130	122	145.3	58.0	0.099
21	5-Jun	0.100	381	358	317.8	0.137	146	104	118.8	62.6	0.099
22	11-Jun	0.096	495	439	396.3	0.153	155	157	197.8	50.1	0.100
	Average	0.096	426		341.6	0.147			182.8	43.7	0.100

* Load = 8.34 (WW flow) (OCL CBOD) - see note a

OCL = Orange County Lab

WTL = Watchtower Lab

% removal (primary) = 100[(WWTF CBOD influent load) - (primary effluent CBOD load)] / (WWTF CBOD influent load)

Note:

a - lost sample, use WTL value for influent CBOD

Supplemental Flow Data from Monthly Wastewater Facility Operations Report as reported to the Putnam County Department of Health

Month (2008)	Avg Monthly WW Flow mil gal/day	Population	WW Flow gal/ person /day
Jun	0.085	1138	74.7
Jul	0.090	1128	79.8
Aug	0.085	1153	73.7
Sept	0.091	1170	77.8
Oct	0.089	1286	69.2
Nov	0.089	1173	75.9
Dec	0.086	1147	75.0

Table 1

The results of the 20-week BOD study indicate that the WWTF will be adequate to handle the projected BOD loads after the amended site plan is implemented. Also, using the average daily influent flow of 96,000 gpd from the 20-week BOD study, the projected flow for a population of 1,803 would be 150,900 gpd, without correction for lower weekend flows. For a population of 2,050, this would be 171,600 gpd. The monthly average flow for the period of test was close to 90 percent of the average midweek flow on the sampling days. Thus, the corrected monthly average flow would be about 135,800 gpd and 154,400 gpd for populations of 1,803 and 2,050, respectively. Planned water conservation and other measures discussed in the "Water Conservation/Reuse/Recycling Options Feasibility Study," particularly the premium quality reduced flow showerheads option, will further reduce the projected flows and in some options, the loads. The total flow reductions for the options selected for implementation, Options A through E, amount to 20,000 gpd for a population of 1,803. Option F, "Reuse of WWTF Effluent in Cooling Towers," produces a variable reduction depending on time of year, ranging from 1,500 gpd in January to 18,000 gpd in August (1,803 population). Effluent reuse options such as Option F would not reduce flow through the WWTF, but would reduce the flow discharged under the SPDES permit. Flow projections will be discussed further in connection with the potable water system portion of the DEIS, based on the 31-month study period from June 2006 through December 2008.

The case of single unit activated sludge operation deserves consideration. This occurs when one unit is out of service as necessitated by mechanical problems (short-term) at any time, or during scheduled down time such as for painting submerged equipment (longer term and which is typically scheduled during the warm part of the year). For this it may be advisable to improve primary removal by using both primary clarifiers. Chemically enhanced primary treatment is another possibility and was allowed for in the design, but this is probably not warranted except in extreme cases.

The only changes required to the WWTF under the amended site plan are a result of possible recycling/reuse options that may require relocating the final effluent meter downstream of the chlorine contact tank (including a new meter pit), covering the contact tank for algae control, and related minor changes such as controls. The present SPDES permit uses the influent meter to record flow, but this would need to be changed to the new downstream meter location to remove recycled flows from the amount discharged to Mountain Brook.

NITRIFICATION

The following demonstrates ability to nitrify during winter conditions:

Temperature for nitrification = 10^o C (water in aeration tank)

Specific nitrifier growth rate $u_{N(10^o)} = 0.180\ day^{-1}$
Soap and Detergent Assn., *Phosphorous and Nitrogen Removal from Municipal Wastewater*, 2nd ed., p. 13)

$kNd = 0.05\ day^{-1}$

Heterotrophic yield coefficient, a = 0.60
(estimate based on results from field observations)

$$SRT = \frac{1}{u_N - k_{Nd}} = \frac{1}{0.180 - 0.05} = 7.7 \text{ days}$$

Safety factor = 2.5

SRT design = 2.5 x 7.7 = 19.2 days

$$\text{Organic removal rate, } q_b = \left(\frac{1}{(SRT\ design)}\right) + 0/05 = 0.170\ \frac{lb\ BOD\ removed}{lb\ MLVSS - day}$$

(EPA Design Manual for Nitrogen Control, 1975, p. 4-10)

$$\text{Hydraulic detention time (HDT) required} = \frac{S_0 - S_1}{X_1 q_b}$$

TBOD to aeration = CBOD + NOD
NOD (nitrogenous oxygen demand) = 4.5 (NH_3 mg/l)
Average NH_3 from monthly reports to PCDOH = 24 mg/l

NOD = 4.5x24 = 108 mg/l

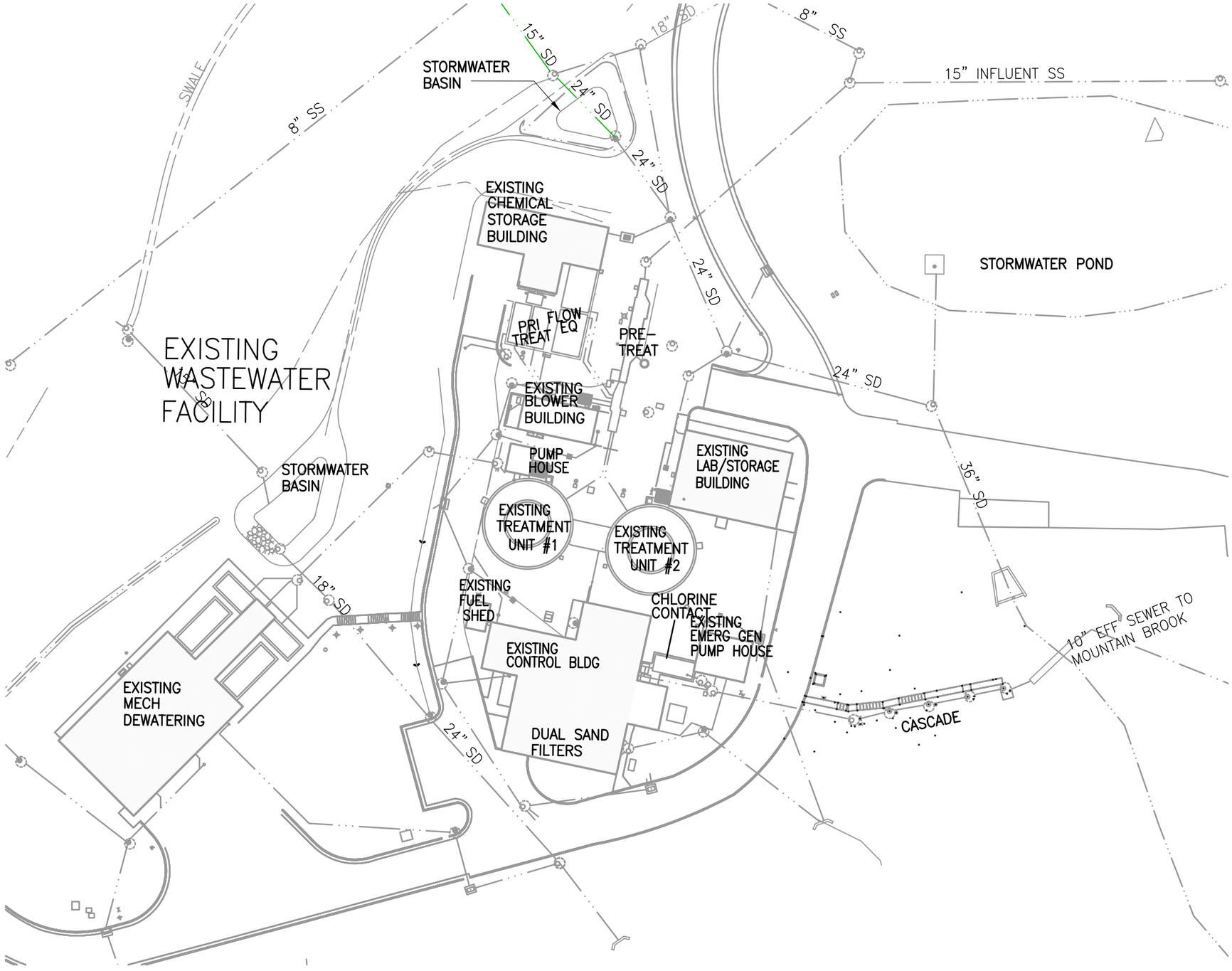
CBOD = $\frac{182.8}{8.34 \times 0.147}$ = 149.1 mg/l (ave. for 20-wk. test)

TBOD to aeration = 257.1 mg/lS_0 = TBOD to Aeration tank = 257.1 mg/l

S_1 = Effluent TBOD= 2 mg/l
X_1 = MLVSS = 3000 mg/l

$$\text{HDT required} = \frac{So - S_1}{MLVSS \times q_b} = \frac{257.1 - 2}{3000 \times 0.170} = 0.500 \text{ days} = 12.0 \text{ hrs}$$

Available detention time (full aeration rings) = $\frac{23{,}400 \times 7.48 \times 24}{165{,}000}$ = 25.5 hrs. > 12.0 hrs. OK



1 PLAN – WASTEWATER TREATMENT FACILITY

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DIMSCALE: 600.00
PLOT DATE: 9 Jul 09

WATCHTOWER
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OF NEW YORK, INC.
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BROOKLYN,
NEW YORK, 11201

MARK:	DATE:	DESCRIPTION:

OWNER:

WATCHTOWER BIBLE & TRACT SOCIETY
25 COLUMBIA HEIGHTS
BROOKLYN, NY 11201

ACCOUNT No.

PROJECT TITLE:

WEC AMENDED SITE PLAN
100 WATCHTOWER DRIVE
PATTERSON, NY 12563

SHEET TITLE:

WASTEWATER TREATMENT FACILITY SITE PLAN

PROJECT No.
PPAT0104

SHEET No.
FIG 1

DIMSCALE: 1.0000
PLOT DATE: 9 Jul 09

DSGN\DRFT: JD
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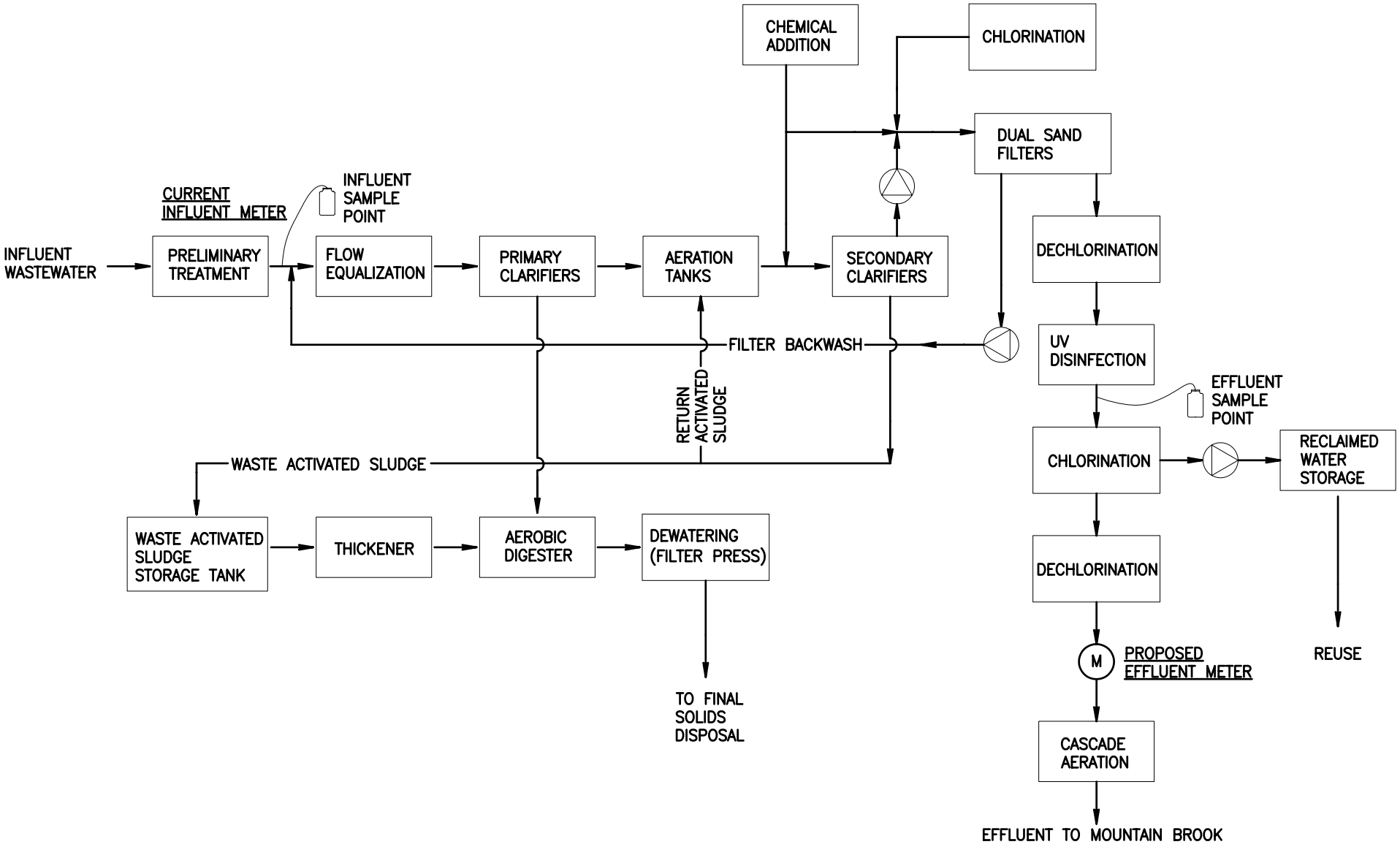

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MARK:	DATE:	DESCRIPTION:

OWNER: WATCHTOWER BIBLE & TRACT SOCIETY OF NY, INC.
ACCOUNT No.

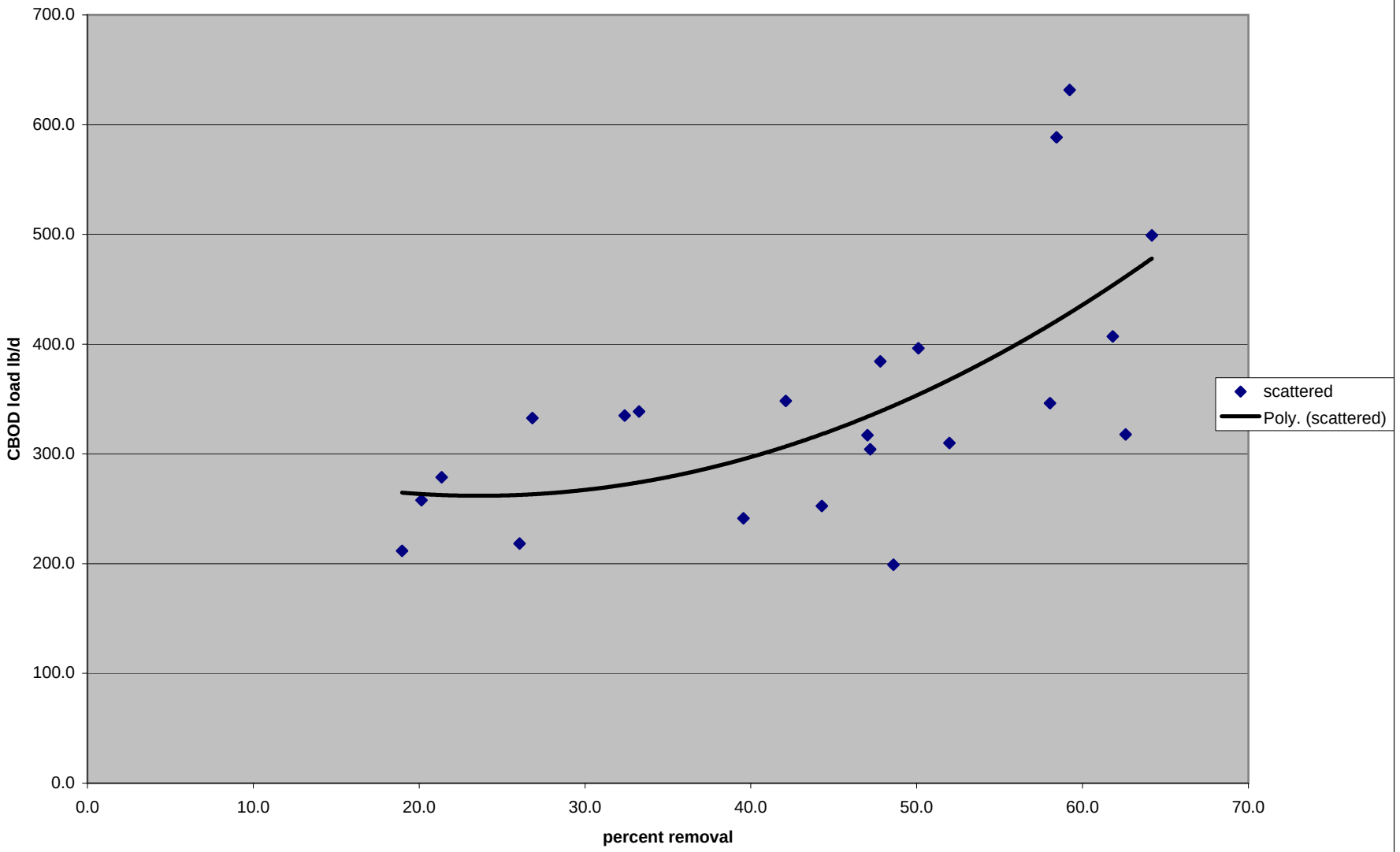
PROJECT TITLE: WEC AMENDED SITE PLAN

SHEET TITLE: WASTEWATER TREATMENT FACILITY SCHEMATIC

PROJECT No. PPAT0104

SHEET No. FIG 2

Figure 3


700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
CBOD load lb/d
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
percent removal
scattered
Poly. (scattered)

WASTE ASSIMILATION CAPACITY ANALYSIS
FOR THE WATCHTOWER EDUCATIONAL CENTER
PATTERSON, NEW YORK
August 2008

A. Background

The proposed expansion of the Watchtower Educational Center and Hotel is being planned with an ultimate population of 2050. The wastewater discharged from this project would be treated by an advanced wastewater treatment facility discharging into Mountain Brook, a Class C stream. This WAC analysis was performed for Mountain Brook to evaluate the impact of treated wastewater discharge from the present treatment plant with the larger population.

The analysis was performed in accordance with the NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) 1.3.5 "Waste Assimilation Capacity Determinations for Isolated Wastewater Discharges in Fresh Water Streams," October, 1990.

B. Stream Information

Mountain Brook, Index No. H31-P44-24-23, is now officially classified as a Class C stream. At the time of the November, 1987 WAC analysis, it was a Class D stream. The statistical minimum average seven consecutive day stream flow occurring once in 10 years (MA7CD10) was determined to be zero CFS by the NYS DEC Bureau of Monitoring Assessment Survey Section. TOGS 1.3.5 gives the minimum dissolved oxygen concentration at any time for Class C streams as 4 mg/1. The SPDES permitted pH is to be between 6.0 and 9.0. TOGS 1.3.5 sets a total ammonia standard of 8.48 mg/1 based on a water temperature of 25 degrees C and a pH of 7.0

A field inspection of the stream bed was conducted and was found to have rapid drops in elevation and numerous changes in direction. This is a swift stream with an "f" value, for the purpose of this WAC analysis, of 4.0.

C. Wastewater Characteristics

The proposed wastewater flow rate for the project is 165,000 gpd (0.165 mgd). Monitoring reports of the Watchtower Educational Center WWTF plant operation submitted to the Putnam County DOH each month consistently show a final effluent concentration of less than 3 mg/l for CBOD and less than 1 mg/l for NH_3. The minimum permitted dissolved oxygen in the effluent to the stream is 7.0 mg/l.

D. Results of WAC Analysis (See Table 1)

The calculations show an effluent TBOD from the WWTF of 10.3 lb/day. The assimilation capacity of the effluent stream is 32.3 lb/day. Therefore the effluent quality is within the acceptable limits. The allowable ammonia discharge to the stream is 11.7 lb/day and the treatment plant as proposed would discharge 1.4 lb/day. The above figures indicate that the surface water quality should not be affected or become impaired due to the effluent discharge from the existing plant with a population increase to 2050.

Table 1
WAC Analyses Summary for Class C Stream

Stream Information

Name: Mountain Brook
Index Number: H31-P44-24-23
Classification: C
(MA7CD10) Flow: 0 cfs (0 mgd)
Min. D. O. (mg/l): 4
Max. Ammonia (mg/l): 8.48 @25^0 C and pH 7.0
Self Purification Factor (f): 4

Wastewater Information (final effluent)

$CBOD_5$ (mg/l): <3.0 mg/l
NH_3 (mg/l): < 1.0 mg/l
Flow (mgd): 0.165
Effluent D.O. (mg/l): 7.0
Population: 2050
Elevation: 500 ft. (discharge point)

Process Information

Waste deficit $D_w = C_s$ – D.O. waste (mg/l) = 8.1 – 7.0 = 1.1
Dissolved Oxygen Deficit, D_a (mg/l): 1.1
Critical Deficit, D_c (mg/l): 8.1 – 4.0 = 4.1
Ultimate Effluent Oxygen Demand (lb/day): L_a = 23.5 (from Fig. 2)
Wastewater Assimilative Capacity (lb/day): (0.165 + 0) x 23.5 x 8.34 – 0 = 32.3
Effluent TBOD Loading (lb/day): (3+ 1 x 4.5) x 0.165 x 8. 34 = 10.3
Allowable NH_3 (lb/day): 11.67
Effluent NH_3 (lb/day): 1.38

WATCHTOWER EDUCATIONAL CENTER

ENGINEERING REPORT

Wastewater Collection,
Treatment, and Disposal

Patterson, New York
December 7, 1987

Revised August 1, 1989

WASTEWATER TREATMENT FACILITIES AT PATTERSON
8/1/89

A. Description of Project

B. Wastewater Flows and Loadings

C. Treatment Requirements

D. Collection and Preliminary Treatment

   1. Collection System

   2. Preliminary Treatment

E. Secondary Treatment

   1. Introduction

   2. Process Facilities and Diagrams

   3. Basis for Design and Design Data

F. Tertiary Treatment

   1. Introduction

   2. Chemical Addition for Phosphorus Removal

   3. Tertiary Sand Filtration

   4. Ultraviolet Disinfection

   5. Performance and Reliability

G. Solids Processing and Disposal

   1. Aerobic Digestion

   2. Solids Disposal

H. Provision for Future Flow Increase

References

WATCHTOWER EDUCATIONAL CENTER

Wastewater Collection, Treatment, and Disposal

Patterson, New York

A. DESCRIPTION OF PROJECT

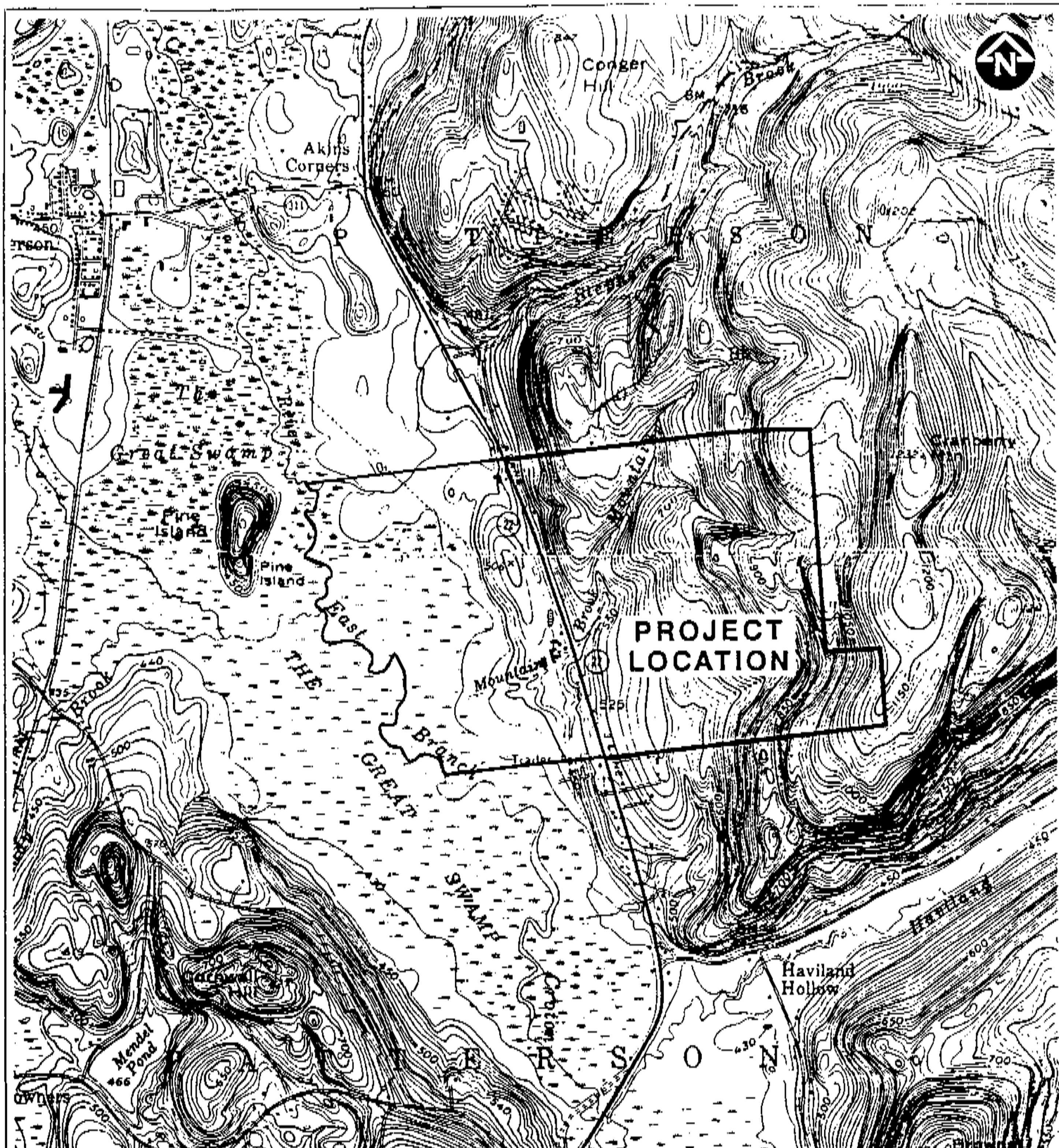
A preliminary submittal giving a brief description of this project was submitted to the Department of Environmental Conservation (DEC), New Paltz, New York, by Randolph Laurent, P.E., on February 11, 1985. A number of changes in the planned development have been made since that submittal which will be described below, but the total scale of development is roughly the same. Water supply aspects of the development were considered in a submittal dated November 9, 1988.

The project will consist of an educational center having approximately 624 one bedroom apartments to house a resident population of 1224 student, administrative, and support personnel. A central dining facility and central laundry are planned as part of the development. The hotel complex will consist of 152 rooms and small laundry having 5 machines, but the restaurant is no longer included in the plan. The sites for these facilities are as previously described on the 375 acre parcel east of Route 22, with the hotel on a 12 acre subdivision. Due to the common ownership by Watchtower of both the educational center and the hotel properties, DEC determined on December 27, 1988 that a Sewage Works Corporation will not need to be formed to meet the requirements of 6NYCRR 752.1(f).

The wastewater treatment facility (WWTF) is located on the east side of Route 22 north of the educational center building complex at about El. 600, permitting gravity flow from most of the main complex but not the hotel. The treated effluent will be discharged to Mountain Brook. Mountain Brook is an intermittent stream discharging into the East Branch of the Croton River which feeds the East Branch Reservoir about 8 miles downstream in the New York City water supply system, as shown on attached Figures 1-1 and 3-1 extracted from the Environmental Impact Statement for the project.

The WWTF system layout, flowsheet, and hydraulic profile are shown on Figures 1 through 3, respectively. The site layout and facility layout are shown on Sheets D1 and D32, respectively.

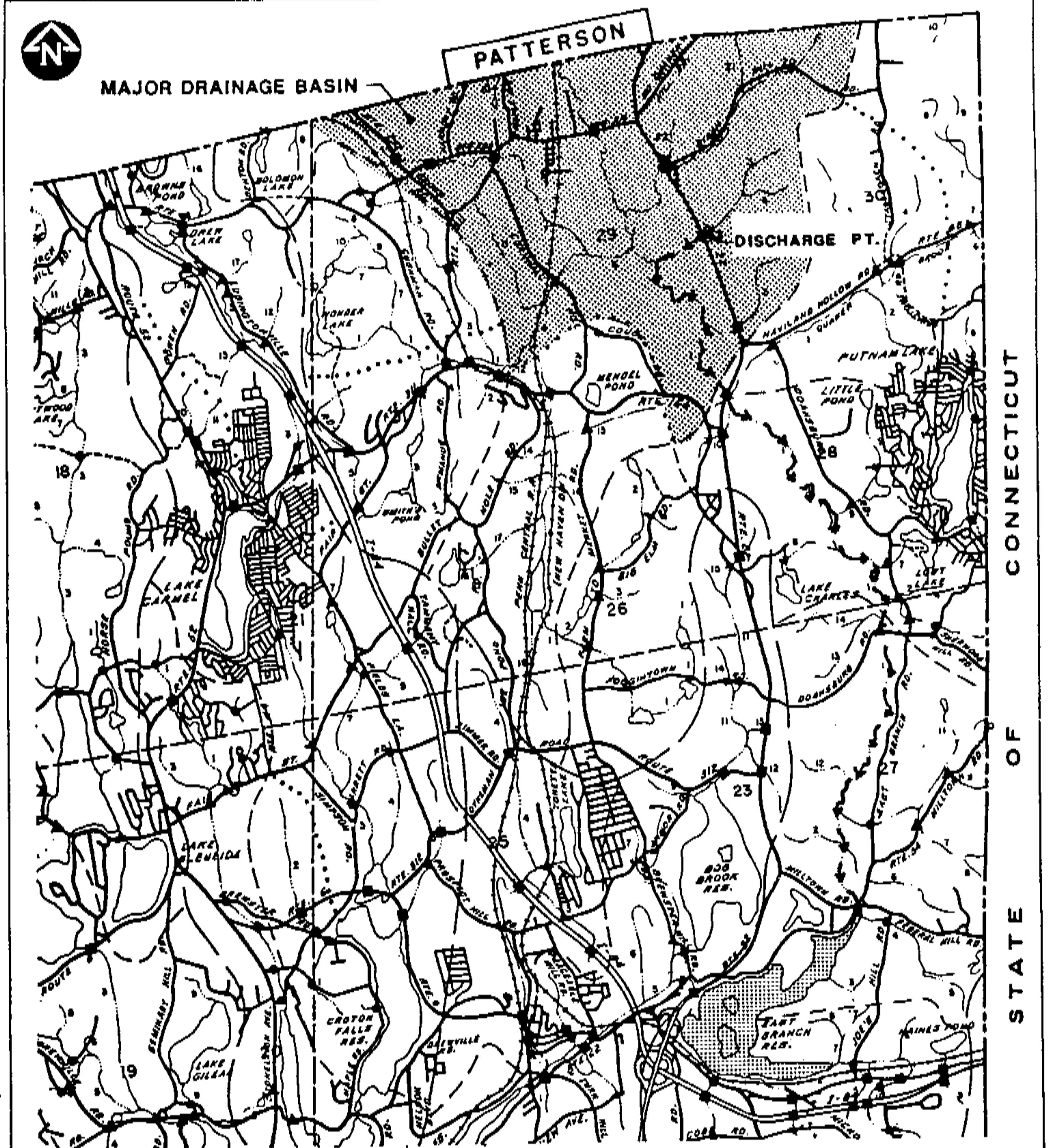
The WWTF will be constructed as one of the first elements of the project, along with the hotel and the interconnecting lift station, force main and gravity sewer. This will allow the hotel units to be occupied by the construction workers when needed for the educational center. A temporary kitchen will also be set up in the storage/vehicle building east of the hotel to serve the construction workers residing in the hotel. Due to the resulting small flows and loads during this initial period of operation lasting several years, the WWTF will be designed for reduced scale operation with temporary provisions as shown on Figure 4, to be described subsequently.



SOURCE: U.S.G.S. 7.5 min. Topographic Quadrangles; Brewster, NY-CT; Pawling, NY-CT

SCALE 1"=2000'	SHEET TITLE SITE LOCATION PLAN	FIGURE NO.
DATE 5/87	PROJECT TITLE WATCHTOWER EDUCATION CENTER PATTERSON, NEW YORK	1-1
DWN BY RAP		
CK'D BY		
JOB Nº.		

WATCHTOWER
BIBLE & TRACT SOCIETY OF N.Y., INC.
25 COLUMBIA HEIGHTS BROOKLYN, N.Y. 11201 U.S.A.



SOURCE: Putnam County Drainage Base Map

SCALE	1"=6500'
DATE	5/87
DWN BY	RAP
CK'D BY	
JOB Nº.	
PRINT DATE	

SHEET TITLE **REGIONAL HYDROLOGY**

PROJECT TITLE
WATCHTOWER EDUCATIONAL CENTER
PATTERSON, NEW YORK

WATCHTOWER
BIBLE & TRACT SOCIETY OF N.Y., INC.
25 COLUMBIA HEIGHTS BROOKLYN, N.Y. 11201 U.S.A.

FIGURE NO.

3–1

B. WASTEWATER FLOWS AND LOADINGS

The following is a summary of flows tributary to the wastewater treatment facility discharging into Mountain Brook:

EDUCATIONAL CENTER	POPULATION	UNIT FLOW, gal/cap.d	TOTAL FLOW, gpd
624 one bedroom apts.	1224	100	122,400
Central laundry	1224	10	12,240
Visitors	125/d	20	2,500
			137,140
HOTEL			
152 rooms (with kitchenettes)		150/rm.	22,800
Laundry, 5 machines		400/mach.	2,000
Total			161,940
Use 165,000 for design			

The domestic wastewater is assumed to have the following loadings, consistent with the "Recommended Standards for Sewage Works" (Ten States Standards)[1]:

	lb/cap.d → UNIT LOAD, POP	ASSUMED lb/d	LOADING,
BOD_5	0.17	1500*	255
Suspended solids	0.20	1500	300

*1224 + 152 x 1.5 + 125 x 0.2 = 1477 Call 1500

Note: Biocides and corrosion control chemicals for the proposed high temperature water, chilled water, and condenser water systems at the Educational Center will be limited to the following: Oxite-M, Kem-Test, Kemcolloid-S, Kem Cor, and sodium hydroxide.

C. TREATMENT REQUIREMENTS

The final Phase II (Educational Center) effluent limitations for discharge to Class D waters (Mountain Brook) as contained in the SPDES discharge permit are as follows:

Parameter	Frequency	Limit, mg/l
BOD	Monthly*	5
Suspended solids	Monthly*	10
Ammonia	Monthly*	2 as NH_3
Phosphorus	Monthly*	1 as P
Dissolved oxygen	Daily	7.0
pH	Daily	6.0 to 9.0 (pH units)
Settleable Solids	Daily	Less than 0.1 ml/l
Fecal Coliform	30 day geometric mean	200 colonies/100 ml
	7 day geometric mean	400
Temperature	Daily	Not specified

* Monthly average of weekly values

D. COLLECTION AND PRELIMINARY TREATMENT

1. Collection System

Conveyance of raw wastewater to the WWTF will be by gravity sewer, with the exception of the storage building in the southernmost part of the main complex and the hotel facilities, which will require lift stations and force mains, connecting with the gravity sewer serving the main complex. The farm facilities west of Route 22 will continue to use the new septic systems and drain fields. These have SPDES Permit Nos. NY 0207900 (UPA3724-27-1) for outfall 001, and NY 0208434 (UPA3724-27-2) for outfall 002. Note that these are on a different parcel from the educational center outfall, which is on the east side of Route 22.

2. Preliminary Treatment

Preliminary treatment includes the following unit operations:

a) Comminution by channel-type comminuter with by-pass bar screen
b) Grit removal
c) Flow monitoring by Parshall flume
d) Flow equalization by off-line tank

The first three items are included in the pretreatment area shown on Figure 7. (Sheet D33).

A single manually cleaned grit chamber will be provided with channel and gates for by-passing during degritting.

The flow equalization tank will be incorporated into the secondary treatment unit as shown on Sheets D40 and D42 and discussed in the following section. It is designed as an off-line unit sized to store most of the volume above the diurnal flow hydrograph in excess of average flow for the critical period in the morning when showers are being taken. The flow in excess of about double the average flow is diverted from the line to the activated sludge aeration tank by side overflow weir discharging to the flow equalization tank as shown on Sheet D45. The wastewater stored in the flow equalization tank is supplied with air at not less than 1.25 cfm/1000 gal to keep solids in suspension and maintain a minimum dissolved oxygen level of 1 mg/l.

Pumps are used to transfer the stored wastewater to the aeration tank during periods of low flow. Piping will permit the pump discharge to be directed to either aeration tank. A minimum flow equalization volume of approximately 2000 cu ft per unit is needed to reduce the peak flow to about double the average flow. In view of the dual use of one flow equalization tank as an aeration tank, a somewhat larger volume based on the flows and loads from the hotel during the initial period of operation will be needed.

E. SECONDARY TREATMENT

1. Introduction

Secondary treatment will use the diffused air activated sludge process, preceded by preliminary treatment including comminution of raw solids but without primary sedimentation, as discussed in the previous section. The flow equalization tank is incorporated into the activated sludge unit as discussed below.

Two identical complete units will be provided, which can be operated in parallel for normal operation, or as separate units when one unit is adequate before the design population is reached, or for infrequent brief periods when one unit is out of service for maintenance. The units will be operated in the extended aeration mode with elevated dissolved oxygen to achieve maximum soluble BOD uptake and nitrification. Chemicals in liquid form, either alum or ferric chloride and possibly with polymer as a flocculant aid, will be added to the mixed liquor ahead of secondary clarification when needed to improve phosphorus and suspended solids removal. Chemical addition, tertiary sand filtration and disinfection will be considered in the section on tertiary treatment. Solids processing and disposal are considered in the section following tertiary treatment.

2. Process Facilities and Diagrams

Each of the two secondary treatment units consists of a circular secondary clarifier surrounded by an annular tank divided into a flow equalization tank, an activated sludge aeration tank and an aerobic digester, as shown on Sheets D40, D41 and D42. Pretreatment facilities will be located upstream of and between the two units. Aeration blowers and other electrical and mechanical services will be housed in a building located between the pretreatment facilities and one of the secondary treatment units, as shown on Sheets D32 and D46. Sludge thickeners and pumps will be adjacent to the two units - as shown on Sheets D40 and D42. The control building, laboratory, chemical handling and storage, tertiary filtration and UV disinfection facilities will be located in the area downstream of the two units, as shown on Sheets D32 and D34. Cascade aeration facilities will be located in the area south of the treatment plant discharging to Mountain Brook, at a point downstream of the new water supply well.

A flow sheet of the proposed system is shown on Figure 2, and a hydraulic profile of the system is shown on Figure 3. The temporary provisions to permit initial operation serving the hotel only are shown on Figure 4.

3. Basis for Design and Design Data

Under normal operation both units will be operated in parallel in the extended aeration mode, with elevated dissolved oxygen supplemented by chemical addition as necessary to meet effluent limitations.

The achievement of the strict limitations on phosphorus, BOD, and suspended solids will require conservative process loadings and recent innovations in secondary clarifier design[2]. Operation of the aeration tanks in the extended aeration mode with elevated dissolved oxygen (above 2 mg/l) to achieve maximum soluble BOD uptake and nitrification, together with chemical addition for phosphorus removal, will place the major burden for pollutant removal on the secondary clarifiers. Solids separation efficiency will be enhanced by design innovations including a chamber in the aeration tank for chemical addition and rapid mixing, a large center well with hydraulic characteristics to promote flocculation, and inboard weir placement to improve tank hydraulics and minimize solids carry-over. A full-width skimmer and trough and dual rotating sludge collector will be used. The design overflow rate is 305 gpd/sq ft at the design flow of 165,000 gpd. This corresponds to a peak overflow rate of 610 gpd/sq ft, assuming a peak-to-average flow ratio not exceeding 2.0 after flow equalization. The expected performance of the overall system will be discussed in the section on tertiary treatment.

Design data for the secondary treatment system are summarized in Table 1. Values are also shown for the initial period of operation with the hotel only, including a temporary kitchen in the storage/vehicle building serving the construction workers.

TABLE 1

SECONDARY TREATMENT SYSTEM DESIGN DATA

DESIGN PARAMETER		Initial Oper. (Hotel Only)++
Average daily flow, gpd	165,000	25,000**
Peak hr. flow, gpd (after flow equalization)	330,000	50,000
No. of units	2	1
Flow per unit	82,500	25,000
Tank liquid depth, ft	13.7	13.7
Total aeration tank volume cu ft	13,100	2890
Applied BOD @ 0.17 lb/cap.d, lb/d	255	52**
Assumed MLSS (70% volatile), mg/l	4000	4000
F/M, lb BOD/lb MLVSS	0.11	0.105
Assumed sludge yield coefficient, lb/lb BOD*	0.35	0.35
Sludge production, lb/d (dry solids)*	89	18
Mean cell residence time, days+	26.5	28.5
Air requirement @ 3000 cu ft/lb BOD, cfm[ss]	530	108
Clarifier diameter, ft	20.0	20
Centerwell diameter, ft	7.5	7.5
Total clarifier surface area, sq ft (deducting centerwell)	540	270
Clarifier overflow rate at average daily flow, gpd/sq ft	305	92
Clarifier overflow rate at peak hr flow, gpd/sq ft	610	184
Clarifier side water depth, ft	12	12
Total clarifier volume, cu ft	7540	3770
Clarifier detention time at average flow, hr	8.2	27

* Approximate values for estimating sludge quantities for disposal, including volatile solids reduction in aerobic digestion but excluding chemicals which will depend on type of chemical used. For ferric chloride dosing at an Fe: P ratio of 2, sludge production is estimated to increase by about 15 percent, giving a total dry solids production of 1.15 x 89 = 102 lb/d.

\+ Assumes 40 percent volatile solids reduction in aerobic digester, sludge solids before digestion 70 percent volatile.

ss Blower capacity with one blower out of service. Includes air required for nitrification. Three 330 cfm, two 118 cfm and one 57 cfm variable speed blowers are proposed. Two 118 cfm and one 57 cfm blowers are sufficient for the hotel only.

++ Modified unit using flow equalization tank of treatment unit 1 as an aeration tank.

** Includes allowance for a temporary kitchen in the storage/vehicle building during construction.

A trivalent metal salt, either alum or ferric chloride depending on economics, is proposed for the principal chemical additive, which may be supplemented with polymer when needed as a flocculant aid. This approach was used for phosphorus removal at several plants in New York State, the results being reported by Switzenbaum, et al[5]. The Gates-Chili-Ogden plant used alum added ahead of the secondary clarifier following conventional activated sludge aeration, whereas the Big Sister Creek plant at Angola, N.Y. used ferric chloride following extended aeration, in a separate clarifier. Both achieved an effluent phosphorus concentration under 1 mg/l. Effluent BOD was much lower (2 vs 16 mg/l) for the Big Sister plant, partially due to the lower soluble BOD level with extended aeration (MCRT = 20 days).

3. Tertiary Sand Filtration

High rate effluent filtration of the clarified effluent will be provided as needed to meet the discharge requirements, using a proprietary filter of the pulsed bed type containing integral clearwell and mudwell as a package unit. The unit will be similar to the "Hydro-Clear" Model F2-93 tertiary filter shown on the attached Zimpro drawing 70.0-2299-D-401 dated 1/9/89, cell profile sketch dated 1/9/89, and design data sheet dated 1/9/89. Two filters with a surface area of 46.25 sq ft each are provided to give a filtration rate at peak flow of 5 gpm/sq ft with one unit out of service, or 1.25 gpm/sq ft at design flow with two units in service. Filter medium consists of a 10 inch bed of 0.45mm sand with a uniformity coefficient of 1.7 or less. Design backwash rate is 12 gpm/ft^2 for 3.5 minutes. Clarified effluent will be supplied to the filter by a variable speed low shear pump located in the filter room. A second pump is provided as backup. Duplicate backwash and mudwell pumps will also be provided. Discharge from the mudwell pumps is returned to the flow control structure on the influent sewer.

4. Ultraviolet Disinfection

Disinfection of the tertiary treated wastewater will use a ultraviolet disinfection system meeting the following requirements:

Certified minimum delivered dosage at peak flow and 70% lamp output based on bioassay method * using similar effluent and UV disinfection unit:

16,000 microwatt-seconds per sq cm at 2537 angstroms

* Certification by equipment supplier using method described in Reference 4

Minimum contact time at peak flow: 7 seconds

The disinfection unit is designed for peak flow, and shall be equipped with an ultraviolet intensity monitoring device with alarm circuit to control room, individual lamp monitoring, and provisions for in-place chemical cleaning. The unit proposed is Ultraviolet Purification Systems, Inc. Model EP12L, rated for 240 gpm flow. A spare unit and space for a future unit will also be provided.

5. Performance and Reliability

The proposed full treatment using chemicals throughout the year is considered the most reliable and effective means available for ensuring compliance with discharge requirements at the site under consideration. Process control and instrumentation features will be incorporated in the design and standby equipment will be provided to enhance performance and reliability. Continuous dissolved oxygen monitoring in the aeration tanks will be used to control the blower air supply to match the requirements for nitrification. Chemical feed rates will be determined by frequent jar testing, and feed pumps will be suitable for automatic flow proportional control based on a pulsed signal from the effluent flowmeter transmitter. Programmable logic control (PLC) will be used for control functions, coupled with a CRT, printers and strip chart recorder for display of process variables and reporting, including alarms.

The laboratory located in the control building of the wastewater treatment facility will be equipped for all normal process control and monitoring requirements for both the water and wastewater systems. Water and sludge samples requiring analyses of metals, trace organics and other restricted substances for which the lab is not equipped will be sent to an approved commercial laboratory. During the initial period of operation, the Patterson laboratory will operate as a satellite to the certified Watchtower Farms laboratory at Wallkill, N.Y., until the Patterson laboratory is certified.

5. SOLIDS PROCESSING AND DISPOSAL

Sludge from the secondary clarifier will be gravity thickened, stabilized by aerobic digestion, and pumped to a loading station for private hauling to an approved disposal site as liquid sludge for the period of initial operation with the hotel only, or as dewatered cake after the educational center is occupied. Sludge disposal will be provided by contract with a licensed scavenger. When the educational center is occupied and the quantity of sludge requiring disposal increases, probably in about five years, dewatering facilities will be added as shown on Figure 32. Mechanical dewatering will probably use a filter press to achieve a solids concentration in excess of 20 percent. This will depend on disposal requirements in force at the time of final design of the dewatering facilities.

Assuming both units operating and a thickened sludge concentration of 4 percent, a total digestion volume of about 3400 cu ft would be needed to achieve a 60 day detention time. The aeration system will be similar to that used for the activated sludge aeration tanks, and will be supplied at not less than 50 cfm per digester. The aerobic digesters, thickeners, loading station, and future dewatering facilities are shown on Sheets D32, D40 and D41.

H. PROVISION FOR FUTURE FLOW INCREASE

Although not currently planned, experience has shown that increases in the flows and loads to wastewater treatment facilities is a likely occurrence. Hence it is prudent to plan for this in the layout and design of treatment facilities.

Tentative provisions for future increase to about 1-1/2 times design capacity are shown on Sheets D1 and D32 for the unit processes of flow equalization and activated sludge aeration. A new flow equalization tank would be constructed upstream of the aeration blower building, and the initial flow equalization tanks would be converted to return sludge aeration tank volume. An additional tertiary filter could be added between treatment unit 1 and the control building.

Flow passages, piping and metering for the initial facilities will generally be designed to handle the increased flows at least up to 1-1/2 times design peak flow, so that modifications would not be required due to hydraulic limitations of the system. This would also apply to pumps, chemical storage, mixing, feeding, and disinfection systems, although this may take the form of space allocation for future equipment in some cases. Should future peak flows exceed the above value, sufficient space has been allowed at the site for additional flow equalization storage, as well as additional treatment units if necessary.

REFERENCES:

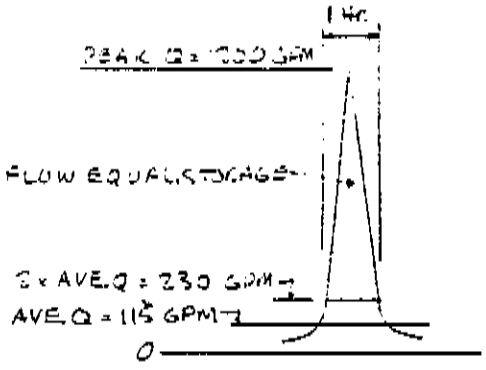
1. Great Lakes - Upper Mississippi River Board of State Sanitary Engineers, "Recommended Standards for Sewage Works", 1978 Edition (Ten States Standards).

2. Parker, D.S., and Stenquist, R. J. "Flocculator - Clarifier Performance", J. Water Pollution Cont. Fed. 58, 214 (1986).

3. Switzenbaum, M.S., et al., "Phosphorus Removal: Field Analysis". J. Environ. Engrg. Div., Am. Soc. Civ. Engrs. 107, 1171 (1981).

4. Ellner, S., "A Guideline to Ultraviolet Wastewater Specifications". Ultraviolet Purification Systems, Inc.

PATTERSON WWTF CALCULATIONS



Clarifier:

Design flow 165,000 gpd
Overflow rate = 300 gpd/ft^2

Net Area = $\frac{165,000}{300}$ = 550 total = 275 ft^2/unit

Add area of 7.5' Ø center well = 44 ft^2/unit
Total area = 319 ft^2/unit

Diameter = $\sqrt{\frac{4A}{\pi}} = \sqrt{\frac{4 \times 319}{\pi}}$ = 20.15' use 20'Ø

Actual overflow rate (excluding center well) = 305 gpd/ft^2

Flow Equalization:

Assumed peak flow in morning due to simultaneous showers = 1200 gpm

If this lasts for 1 hour, volume above (average flow x 2) =
$(1200 - 115 \times 2) \times \frac{60}{2}$ = 29,100 gal

Required Storage = $\frac{29,100/7.48}{}$ = 3890 ft^3 total or 1945 ft^3/unit
(call 2,000 ft^3)

Aeration:

$$F/M = 0.11 = \frac{255 \text{ \#BOD} \times 10^6}{4000 \text{ mg/L} \times 0.7 \times V \times 62.4 \text{ \#/ft}^3}$$

V = 13,270 ft^3 total Use 6,553 ft^3 per unit (see sht. 2)
Actual F/M = 0.111 Volume required for initial operation with hotel only
(304 persons max. @ 0.17 #/cap.d)
= $\frac{304 \times .17}{255} \times 6,553 \times 2$ = 2,656 ft^3 (Includes allowance for temporary kitchen).
Actual F/M with 2,880 ft^3 provide = 0.103

Sludge production including aerobic digester VS destruction =
0.35 x 255 = 89 #/day
Assume 40% VS destruction in aerobic digester. Before digestion:
V = Volatile, F = Fixed.

V (1-0.40) + F = 89 (winter) $\frac{V}{V+F} = 0.7$
F = 89 - 0.6 V
Substituting: V = 0.7 (V + 89 - 0.6 V)

V = 0.7 (0.4V + 89)
0.72 V = 62.3
V = 86.5 #/d

MCRT = $\frac{4,000 \times 13,106 \times 62.4 \times .7}{10^6 \text{ (volatile solids wasted)}}$

MCRT = $\frac{4,000 \times 13,106 \times 62.4 \times .7}{10 \times 86.5}$ = 26.5 days

Aerobic Digester:

VS production = 86.5 #/day. Total solids = 86.5/0.7 = 124 #/d + 15% chemicals = 142 #/d. Thickener can thicken chemical sludge to 4% TS.

Volume raw sludge = $\frac{142}{.04 \times 62.4}$ = 56.9 ft^3/day

For 60 day storage, need 3,420 ft^3 total or 1,710 ft^3/unit

Annular Tankage:

Total volume provided with 40' ID outer shell, 20' ID clarifier, 1' walls.

Annular area = $\frac{\pi \times 40^2}{4} - \frac{\pi \times 22^2}{4}$ = 877 ft^2

1257 380

Deduct 3 walls, 1' x 9' = 27

Net area = 850 ft^2

Volume at 13.7' depth = 850 x 13.7 = 11,645 ft^3

Actual volume for 3 tanks:

Flow equal	(90°)	2,880
Aeration	(200°)	6,553
Aerobic dig.	(70°)	2,212
		11,645 ft^3

Air Requirements:

Aeration:

Air required by Ten States Standards = 2,000 ft^3/#BOD

Use 3,000 ft^3/#BOD to allow for nitrification

3,000 ft^3 x $\frac{255}{1440}$ = 531 cfm total, 266 cfm/unit

Check roll rate at 3 cfm/ft of tank wall = 3 x π x 22 $\frac{(200)}{360}$ = 116 cfm

Flow Equalization:

Air required by Ten States Standards = 1.25 cfm/1,000 gal

= $\frac{5,760}{1,000}$ x 7.48 x 1.25 = 54 cfm total, 27 cfm/unit

Check roll rate = 3 x π x 22 $\frac{(90)}{360}$ = 52 cfm/unit

Aerobic Digestion:

Air required by Ten States Standards = 30 cfm/1,000 ft^3

Volume with 20' ID clarifier = 2,212 ft^3 (see sht. 2)

$$\text{Air required} = 30 \times \frac{2,212}{1,000} = \frac{66}{} \text{ cfm/unit}$$

$$\text{Check roll rate} = 3 \times \pi \times 22 \frac{(90 - 20)}{360} = 40 \text{ cfm}$$

Total Air Requirement:

	cfm/unit	Hotel only
Aeration	266	108*
Flow equalization	52	52
Aerobic digestion	66	66
	384 x 2 units = 768 cfm total	226 cfm total

* Based on 304 persons @ 0.17 #BOD/cap.d = 52 lb BOD/d.
Air = $\frac{52}{255} \times 266 \times 2 = 108$ cfm. Allows for temporary kitchen BOD.

Using blowers similar to Watchtower Farms:

3 at 330 cfm less 1 standby = 2 x 330 =	660	(Sutorbilt 5 MVF at 1950 rpm with 20 hp VS motor)
2 at 118 cfm less 1 standby =	118	(Sutorbilt 3 MVF at 2650 rpm with 7.5 hp VS motor)
1 at 57 cfm =	57	(Sutorbilt 3 MVF at 1240 rpm with 5 hp VS motor)
Total	857	cfm

Tertiary Sand Filter:

"Hydro Clear" model F2-93 pulsed bed wastewater filter with two filters having a filtration area of 92.5 sq ft total, 46.25 sq ft each. Design peak flow = 230 gpm. Required filter area at 5 gpm/sq ft filtration rate = $\frac{230}{5}$ = 46 sq ft, with one filter out of service.

Cascade Aerator:

Use equation given on p. 80 of 1988 DEC "Design Stds. for Wastewater Treatment Works", under "Cascade Aeration".

$$h = \frac{r-1}{0.11\ a\ b\ (1 + 0.046\ T)} = \text{Required drop in ft. thru aerator}$$

$$r = \text{deficit ratio} = \frac{Cs - Co}{Cs - C}$$

Cs = DO saturation of wastewater at temperature T, mg/l

From Table 20 on p. 713 of "Elements of Water Supply & Wastewater Disposal" by Fair, Geyer & Okun:

Temp. °C	DO Sat. mg/l. Cs
10	11.3
15	10.0
20	9.0
25	8.2
30	7.4

CO = Influent DO to aerator, mg/l
C = Required DO after aeration, mg/l
T = Temperature, °C
a = 0.8
b = 1.1

Case 1 - Summer
Summer conditions, wastewater temp. = 25°C max.
Assumed C = 7 mg/l (permit requirements)
Assumed Co, mg/l:
Co = 2 (worst case, no aeration thru filter)

$$r = \frac{8.2 - 2}{8.2 - 7} = 5.17 \qquad h = \frac{5.17 - 1}{.11 \times 8 \times 1.1\ (1 + .046 \times 25)} = \frac{4.17}{0.208} = 20.0'$$ drop thru aerator

Co = 3 (ave.) $r = 4.33$ $h = \frac{3.33}{0.208} = 16.0'$ drop

Co = 5 (incl. aeration thru filter)

$$r = \frac{8.2 - 5}{8.2 - 7} = 2.67 \qquad h = \frac{1.67}{0.208} = 8.03'$$ drop

Case 2 - Winter
Wastewater temp. = 10° C
Co = 2

$$r = \frac{11.3 - 2}{11.3 - 7} = 2.16$$

$$h = \frac{2.16 - 1}{.11 \times .8 \times 1.1\ (1 + .046 \times 10)} = \frac{1.16}{0.141} = 8.23'$$ drop thru aerator

Co = 3

$$r = \frac{11.3 - 3}{11.3 - 7} = 1.93 \qquad h = \frac{0.93}{1.141} = 6.60'$$ drop

Co = 5

$$r = \frac{11.3 - 5}{11.3 - 7} = 1.47 \qquad h = \frac{0.47}{0.141} = 3.33'$$ drop

Note:

Due to relatively high DO saturation concentration in winter, it is much easier to achieve the 7.0 mg/l required DO concentration compared with summer. Even if the cascade aerator is bypassed in winter to prevent freezing, the drop from the weir to the bypass in the first manhole exceeds the required drop for aeration. Also, the turbulent flow in the long and steep discharge line would be more than adequate to achieve 7.0 mg/l at the outlet to Mountain Brook. The total drop between the WWTF outlet weir (El.~594) and Mountain Brook (El~494) is 100 ft. The discharge pipe flows partially full, providing good oxygen transfer across the free surface.

For summer conditions, a cascade aerator drop of about 33 ft. is provided, to exceed the worst case of 2.0 mg/l DO leaving the WWTF without the filter aeration.

WATCHTOWER EDUCATIONAL CENTER

Wastewater Collection, Treatment, and Disposal

Patterson, New York

Revisions to Engineering Report dated August 1, 1989,
based on Three Years of Operation

May 24, 1994

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WATCHTOWER EDUCATIONAL CENTER

Wastewater Collection, Treatment, and Disposal
Patterson, New York

Revisions to Engineering Report dated August 1, 1989, based on Three Years of Operation

May 24, 1994

INTRODUCTION

This revised engineering report has been prepared for the purpose of describing proposed modifications to the Patterson Wastewater Treatment Facility (WWTF) which result from adjustments to the original basis for design following three years of operation, and a proposed change in design population. The basis for design of the currently operating facility was given in the August 1, 1989, engineering report which was a part of the application for approval to construct the facility submitted to Putnam County Department of Health (PCDOH) on August 7, 1989. A draft revision to the engineering report, dated June 14, 1993, was submitted to PCDOH on June 23, 1993, which called attention to differences between the estimated and observed loadings on the WWTF based on the first two years of operation, and described possible modifications to the facilities to accommodate the observed increased loads. Subsequent to the above draft revision, additional testing has been done to clarify the long-term loads. An increase in the design population for the facility from 1,500 to 1,650 has been included due to visitors, plus an allowance of an additional 25 percent for possible future growth. This report thereby supersedes the previous draft report of June 14, 1993.

The proposed modifications to the WWTF are essentially the same as those described as potential additions in the draft revision. These modifications include the addition of new flow equalization tanks, primary treatment, and conversion of the existing flow equalization tanks and aerobic digesters to aeration tanks. The revised flowsheet and hydraulic profile are shown on Figures 1-1 and 1-2, respectively.

DESIGN POPULATION, FLOWS AND LOADS

The assumed design population, flows and loads used as the basis for design of the present facilities are shown in Appendix A, which is page 4 excerpted from the August 1, 1989, engineering report. Since the design population was set at 1,500 in 1989, adjustments for on-site visitors have now raised this number to 1,650. The present flow limitation of 165,000 gpd contained in the SPDES permit would not be exceeded, based on a per capita wastewater contribution of 80 gal/day with 1.6 gal/flush toilets and water conserving fixtures.

In the June 14, 1993, draft revisions to the engineering report, data from tests conducted in December 1992 were presented to show that the per capita loads were about 0.28 pounds of BOD per day, compared with 0.17 from Ten State Standards used for design. It was noted that this increase may have been due to a temporary phenomenon such as construction-related activities, but this had not been definitely established. Owing to the fact that the observed per capita values continued to rise, it was decided to conduct tests at another location, Watchtower Farm in Ulster County, where a stable facility similar to Patterson was in operation but without significant construction activity which would distort the per capita values. These tests were conducted on February 1-3, 1994, and the results are contained in a report "Watchtower Farms Wastewater Study," prepared on March 17,1994. The study found that the average values of organic loading at Watchtower Farms are similar to published values found in the applicable engineering literature, i.e., 0.17 lbs BOD/cap.-day. It also found that it would be appropriate to apply a safety or peaking factor based on site specific factors. For unusually sensitive areas, e.g., where every effluent sample must meet strict limits, a safety factor of 1.5 would be appropriate. An additional allowance may be made to account for the effect of recycle streams from solids processing, e.g., filtrate from the rotary thickener and the recessed plate dewatering press. Due to the high capture efficiencies of these processes (about 95% and 98% of TSS respectively), the recycle loads will be relatively small. Hence, a peaking factor of 1.7 times the average load has been assumed to arrive at peak load. A summary of the original and revised populations, flows and loads are given in Appendix B. The original BOD_5 loading was 255 lb/d. The new average BOD_5 load is 351 lb/d with the peak value of 596 lb/d. This higher design loading will require modifications to the WWTF to ensure compliance with discharge requirements. The modifications are discussed in the next section.

2062 × 17 lb/d = 351 × 1.7 = 596 lb/day

NEED FOR PRIMARY TREATMENT AND ADDITIONAL FLOW EQUALIZATION

The Engineering Report for the wastewater collection, treatment, and disposal system for the Watchtower Educational Center at Patterson, New York, dated December 7, 1987, was a part of the SPDES application documentation submitted on December 18, 1987. The wastewater treatment facility design was based on the activated sludge treatment process with flow equalization but no primary treatment.

The activated sludge process design is strongly affected by the requirements for nitrification to meet effluent ammonia limits. Nitrification is particularly a problem in winter when the growth rate of nitrifying organisms is very slow. For this reason, the December 7, 1987 design of this facility incorporated breakpoint chlorination to supplement biological nitrification when needed in the winter. This utilized the chlorination/dechlorination facilities then proposed for effluent disinfection. However, as a result of discussions with NYSDEC and PCDOH the method of disinfection was changed to ultraviolet, which meant that the facilities for breakpoint chlorination would no longer be available. Based on discussions with Mr. Ed Reilly of NYSDEC White Plains office on July 22, 1987, we were advised that ammonia limits would be relaxed in the winter in accordance with the April 1, 1987, NYSDEC standards for class D streams, e.g. 12.1 mg/l NH_3 at 20° C, and 17.6 mg/l at 15° C, both at pH 7.0. With this in mind, the use of breakpoint chlorination was considered unnecessary. The above winter relaxation of ammonia

limits was noted in the Engineering Report dated August 18, 1988, submitted on August 25, 1988, which also noted the change to ultraviolet disinfection from chlorination/dechlorination shown in the December 7, 1987, report.

When the SPDES permit was finally issued on August 11, 1989, there was no provision for winter relaxation of ammonia limits from the 2.0 mg/l limit now shown. Since we had already submitted the application for approval to construct the proposed facilities on August 7, 1989, we decided to proceed with the design as submitted to avoid a lengthy delay, recognizing that adjustments might be necessary to meet winter nitrification requirements when full load was reached.

A further factor in the ability to meet permit limitations is the requirement to meet the stated limits with every sample. Due to the inherent variability in wastewater characteristics and process performance, most permits base limits on 7-day and 30-day average concentrations. (See 40 CFR 133.102 and Metcalf and Eddy *Wastewater Engineering*, 3rd ed., p. 177.) For this reason, our application was based on "monthly average of weekly values." (See p. 5 of the Engineering Report dated August 1, 1989.) This difference is particularly significant in the case of $CBOD_5$ which has a limit of 5 mg/l in the permit issued August 11, 1989. This results from the great difficulty in measuring this parameter at such low values. (See *Standard Methods*, 17th ed., Sec 5210B6, pp. 5-9 and 5-10.) The lower detection limit of 2.0 mg/l and standard deviation of more than 1 mg/l given in *Standard Methods* makes this test very difficult to meet on every sample even with the best conditions of plant and laboratory performance.

As stated in Section H of the August 1, 1989 Engineering Report included with the August 7, 1989, application:

"Tentative provisions for future increase to about 1-1/2 times design capacity are shown on sheets D1 and D32 for the unit processes of flow equalization and activated sludge aeration. A new flow equalization tank would be constructed upstream of the aeration blower building, and the initial flow equalization tanks would be converted to return sludge aeration tank volume."

In view of the foregoing findings in loads based on three years of operation and the very rigorous treatment requirements, the originally proposed provisions for accommodating future increase in load are considered insufficient for these new loads. We are therefore proposing to add primary treatment and convert both the present flow equalization tanks and digesters to aeration as the ultimate configuration. During the interim period prior to completion of the proposed mechanical dewatering building or the proposed temporary filter press installation, the digesters will continue to be used as they are at present to permit storage of thickened sludge for hauling to incineration off-site. The rotary sludge thickener will continue to operate at its present location during the interim period but will be moved to the mechanical dewatering building when this is operational.

In addition to the changes described above, we also propose to cover most of the tankage with insulated fiberglass building panels to reduce heat loss in winter and hence maintain higher operating temperatures and biological reaction rates. The covers could be removed and stored in the warmer part of the year.

The locations of the existing and proposed new facilities are shown on Figure 1-3, and accompanying full size drawings, Sheets C1.16 and C7.2. Process piping and details of the new flow equalization and primary treatment facilities are shown on Sheets C11.1, C11.2, C11.3, C11.4, C11.5, and C11.6. Structural details are shown on Sheets S7.1 and S7.2.

FLOW EQUALIZATION

A new control structure will be added just downstream of the existing Parshall flume, which will be used to control flow to and from the new flow equalization tanks and primary treatment facilities. The control structure includes a handwheel-operated gate which can be throttled to allow the flow equalization tank to operate off-line as with the present flow equalization tanks using an overflow weir for higher flows. With this gate shut, the entire flow is diverted to the flow equalization tanks via 12" transfer pipes with individual gates to allow a single tank to be used during cleaning or maintenance. An emergency weir allows bypassing if the flow equalization pumps fail. Recycle streams enter the control structure upstream of the handwheel-operated gate, so enter the flow equalization tanks except under bypass conditions.

The flow equalization tanks are designed to normally operate as on-line units, sized to store most of the volume above the diurnal flow hydrograph in excess of average flow for the critical period in the morning when showers are being taken. The flow in excess of about double the average flow is stored in the tanks by controlling the liquid level to be low ahead of peak flows. The active volume of each flow equalization tank, based on plan dimensions of 16 ft x 20 ft and active height of 10 ft (centerline of diffusers to maximum operating level) is 24,000 gal. The wastewater stored in the flow equalization tanks is supplied with air at not less than 1.25 cfm/1000 gal to keep solids in suspension and maintain a minimum dissolved oxygen level of 1 mg/l.

Flow to the primary tanks is transferred from the new flow equalization tanks by a variable speed submersible pump in each tank. The two flow equalization tanks can be operated as a single tank with the sluice gate between the tanks open or as separate tanks with the sluice gate closed. The piping arrangement allows either pump to serve either primary tank, as well as bypassing the primary tanks directly to the primary effluent sewer downstream of the Primary Tank No. 2. Continuous level sensing with backup floats is provided in each flow equalization tank, for computerized control of the variable speed pumps. Parshall flumes downstream of each primary tank can be used to monitor pump flow.

The flow equalization tanks are provided with removable covers constructed from fiberglass foam core building panels, to keep the heat loss to a minimum during winter. This is needed due to the deleterious effect of low wastewater temperatures on nitrification and aerobic digestion.

PRIMARY TREATMENT

The primary treatment tanks are of the conventional rectangular type with chain and flight sludge collectors, as shown on the enclosed Envirex cut sheet in Appendix D. Each tank is capable of handling the average design flow at an overflow rate of 1,000 gallons per day/ft^2 in accordance with *Recommended Standards for Wastewater Facilities*. Design data for the primary treatment system is given in Table 1. A 25 percent BOD removal in primary treatment has been assumed for design of secondary treatment facilities, based on most conservative published data. The primary tanks are covered with removable covers similar to those described for the flow equalization tanks.

The pumped flow from the flow equalization tank to each primary tank is distributed across the width of the tank by an inlet channel with four outlets and an inserted trough with aeration for mixing chemicals when needed. The outlet velocity is interrupted by a vertical baffle which directs the inlet flow in a downward direction.

The effluent launder is set back from the end wall to allow double weirs, and to reduce the tendency of density currents to pass up the end wall and over the weir. The weir loading rate at peak hourly flow with one tank in service is 20,600 gallons/day/ft.

Scum removal is accomplished by the returning sludge collector flights, which sweep the full tank width to a rotating scum skimmer at the far end of the tank, just upstream of the baffle in front of the effluent launder. The scum is removed by rotation of the skimmer, with the scum passing down the pipe to a collection manhole. The scum will be removed from the collection manhole for disposal at an approved disposal site.

Sludge accumulating on the floor of the primary tank is moved by the sludge collector flights to an upstream sludge hopper. From there it is removed by positive displacement pumps with variable frequency drives. A sludge blanket detector will be used to control the rate of sludge pumping to minimize septicity but ensure proper thickening. The pumps transfer the primary sludge to the Unit No. 1 existing digestion tank in the interim period where it is aerated along with waste activated sludge. The primary sludge will be pumped directly to the mechanical dewatering building when this is on-line. The waste activated sludge in the existing Unit No. 2 digester is thickened by the rotary sludge thickener during the interim period and transferred to the Unit No. 1 digester for temporary storage. Prior to completion of the mechanical dewatering building, the thickened sludge will continue to be hauled to a commercial sludge incineration facility for disposal, or pumped to the temporary filter press installation proposed south of the WWTF (Item 14 on Figure 1-3).

Catalog information on the mechanical equipment for the flow equalization and primary tanks is given in Appendix D.

Facilities for chemical addition to the inlet of the primary tanks will be provided for increasing suspended solids and BOD removal. It is expected that chemically enhanced primary treatment (CEPT) will be needed if it becomes necessary to remove a treatment unit from service

for maintenance, or due to equipment malfunction. A building to house chemical storage and mixing facilities is proposed adjacent to the primary sludge pump room, shown as Item 11 on Figure 1-3.

SECONDARY TREATMENT

Based on the revised design loading of 596 lb BOD_5/day and conservative process design parameters for winter nitrification as given in Appendix C, provisions are being made to allow the full outer ring of the treatment units to be used for aeration. This will provide a total aeration volume of 23,400 ft^3 and a volumetric loading of 19.1 lb BOD/d/1000 ft^3. Although the table in Sec. 92.31 of *10 State Standards* lists a 15 lb BOD_5/d/1000 ft^3 loading for single stage nitrification, this loading is based on plant design average BOD_5, and is a requirement "when process design calculations are not submitted." The process design calculations presented in Appendix C of this report show that the aeration volume is adequate for nitrification even if the present aerobic digesters are not converted. Recent operating history has demonstrated satisfactory performance well above the 19.1 lb BOD_5/d/1000 ft^3 loading. Calculations for the secondary treatment system including aeration air requirements and supply are given in Appendix C.

The conversion of the secondary treatment units will be the subject of a future engineering report, possibly including replacement of the present air lift RAS pumping system. At the present time, the conversion will be limited to extending separate 10" primary effluent pipes from the new control structure through the tank wall near the center of the present flow equalization compartment as shown on Figures 1-3 and 1-4. This will allow use of both the present aeration tanks and flow equalization tanks for aeration. As shown by the calculations given in Appendix C, this aeration volume will satisfy nitrification requirements. The final conversion will allow various modes of operation involving one, two, or all three compartments for aeration.

An additional 20 hp blower will be installed in the space presently provided in the blower building to provide sufficient aeration air for the enlarged secondary treatment system. The blower building is shown on accompanying full size drawing, Sheet M2.12.

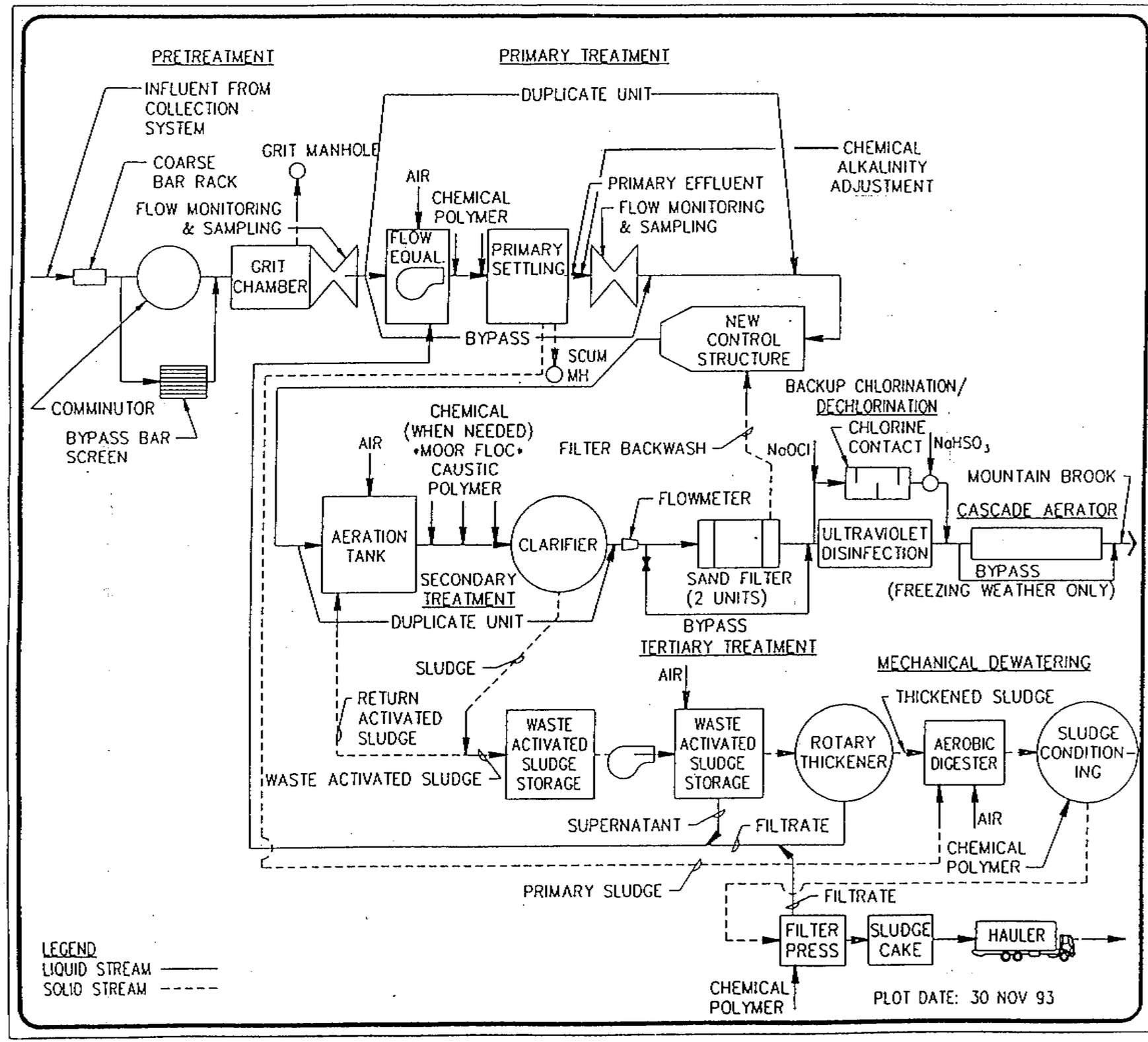
SOLIDS PROCESSING AND DISPOSAL

A separate engineering report will be submitted to cover solids processing and disposal aspects of the Patterson WWTF. As discussed in the June 14, 1993, draft report, a new mechanical dewatering building will be constructed as shown on Figure 1-3, Item 15. As an interim measure, temporary dewatering by the recessed plate filter press proposed for the permanent facility will take place in a temporary building to be located as shown on Figure 1-3, Item 14.

TABLE 1

PRIMARY TREATMENT SYSTEM DESIGN DATA

	Number of Units Operating 1	2
Flow per unit, gpd		
Average	165,000	82,500
Peak hour	330,000	165,000
Total tank width, ft.	8	16
Tank length, overall, ft.	25	25
Tank effective length, excluding inlet/outlet zones, ft.	20.5	20.5
Primary tank effective area, ft^2 (8' x 20.5')	164	328
Tank average liquid depth, ft.	9.0	9.0
Tank volume, ft^3 (based on average depth, effective length)	1,476	2,952
Surface overflow rate at average flow, gpd/ft^2	1,006	503
Surface overflow rate at peak hourly flow, gpd/ft^2	2,012	1,006
Detention time at average flow, hrs.	1.61	3.21
Detention time at peak hourly flow, hrs.	0.80	1.60
Total effluent weir length, ft.	16	32
Weir loading at peak hourly flow, gpd/ft	20,625	10,312
Expected performance:		
Suspended solids removal, percent	63	
BOD removal, percent	25	



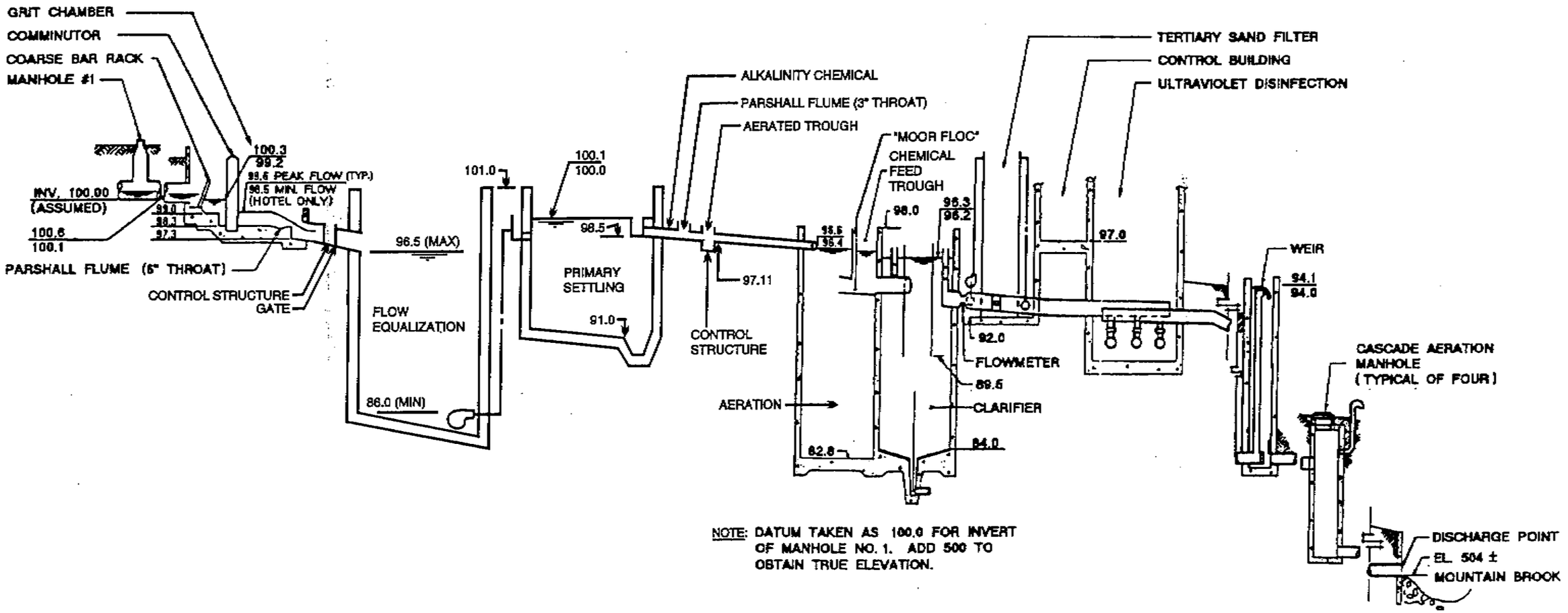
ED-001A

SHEET No. FIG 1.1

SHEET TITLE SYSTEM FLOWSHEET
FIGURE 1-1

PROJECT TITLE EDUCATIONAL CENTER
SITE UTILITIES
TOWN OF PATTERSON, NEW YORK

SCALE	NONE
DATE	26 NOV 93
DWN BY	RWN
CK'D BY	CWD
CAD #	SYSFLO



NOTE: DATUM TAKEN AS 100.0 FOR INVERT OF MANHOLE NO. 1. ADD 500 TO OBTAIN TRUE ELEVATION.

HYDRAULIC PROFILE

Figure 1 - 2

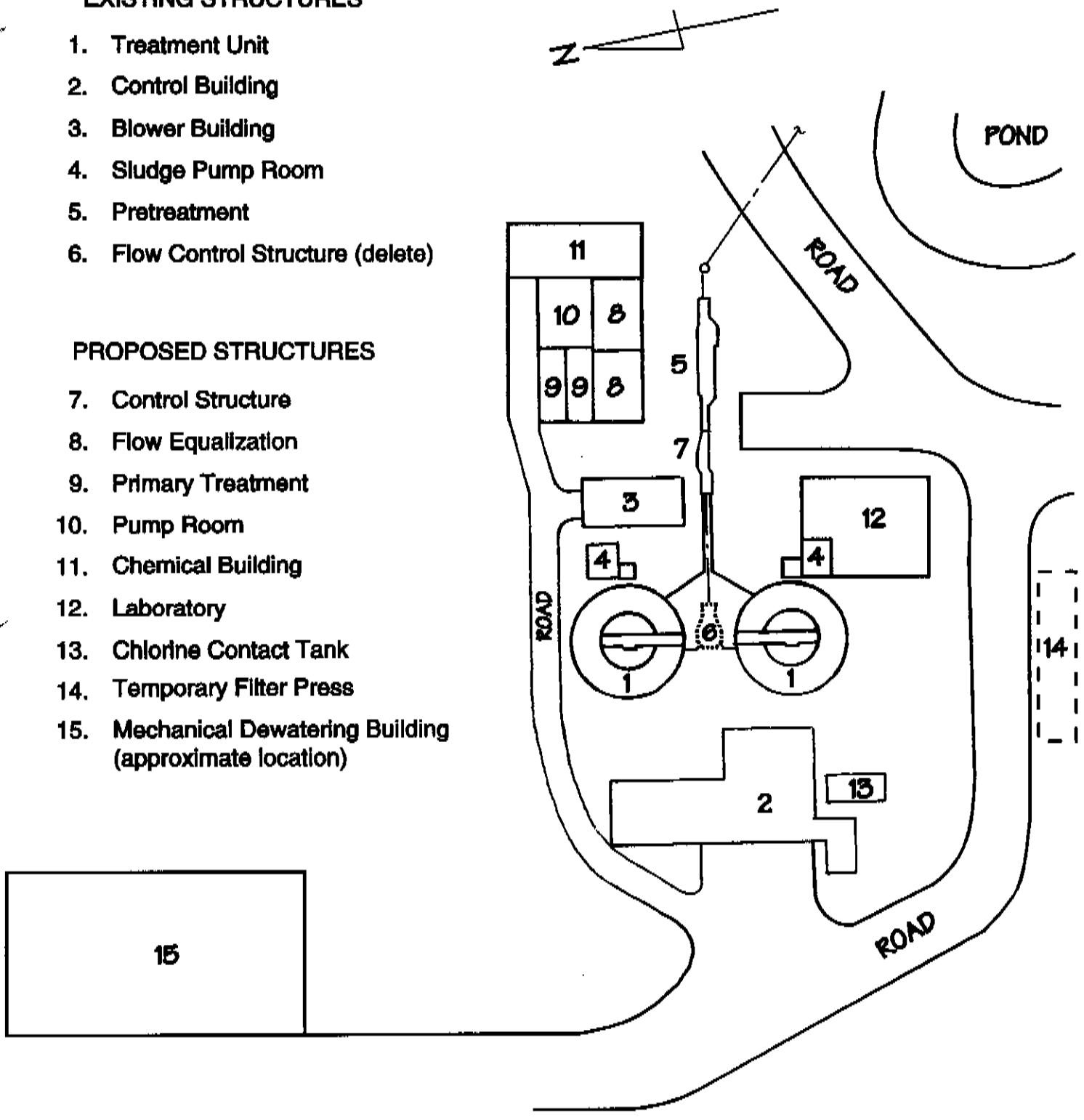
4/08/94

EXISTING STRUCTURES

1. Treatment Unit
2. Control Building
3. Blower Building
4. Sludge Pump Room
5. Pretreatment
6. Flow Control Structure (delete)

PROPOSED STRUCTURES

7. Control Structure
8. Flow Equalization
9. Primary Treatment
10. Pump Room
11. Chemical Building
12. Laboratory
13. Chlorine Contact Tank
14. Temporary Filter Press
15. Mechanical Dewatering Building (approximate location)



SITE PLAN

Figure 1 - 3

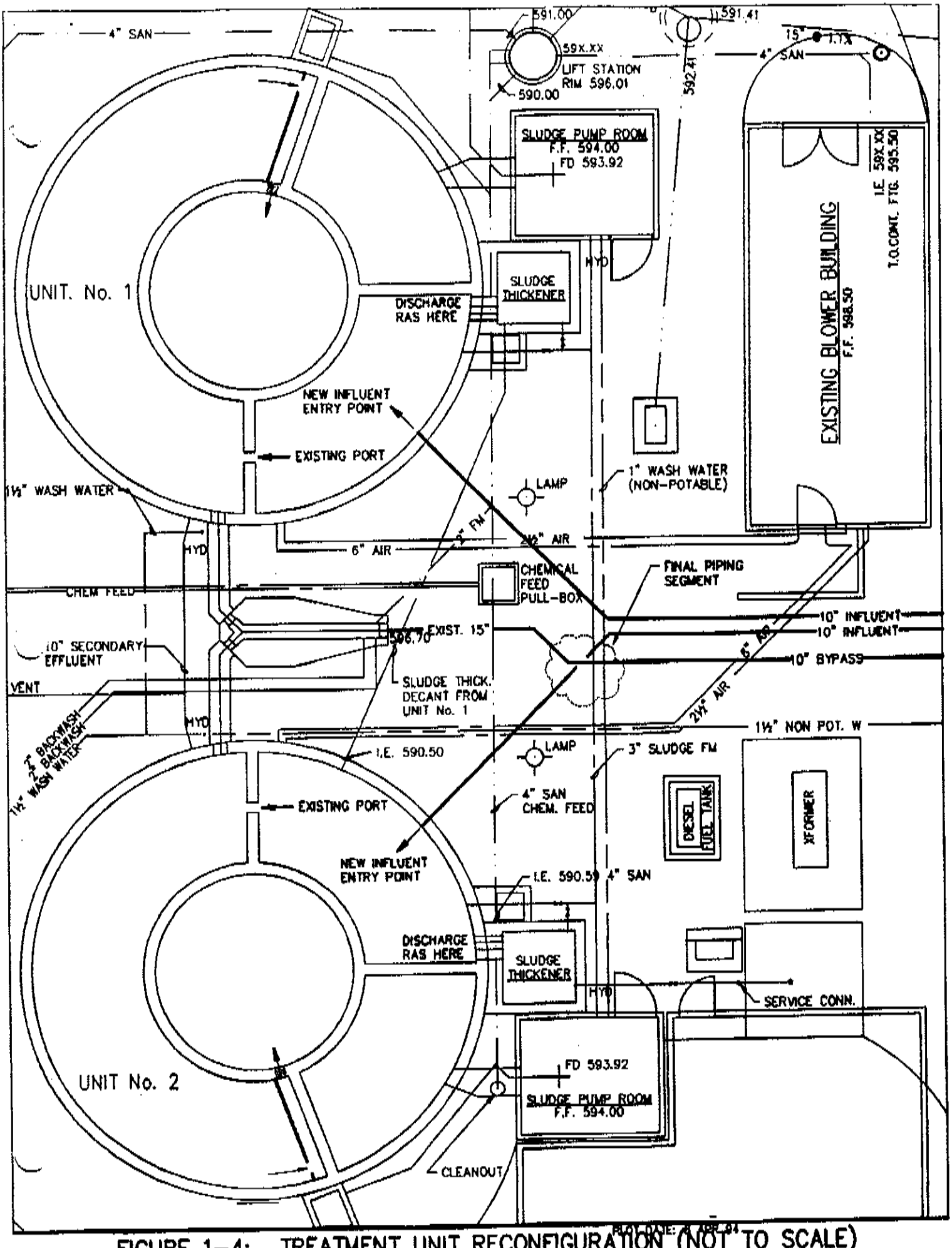


FIGURE 1–4: TREATMENT UNIT RECONFIGURATION (NOT TO SCALE)

APPENDIX A

1 August 1989
Page 4

B. WASTEWATER FLOWS AND LOADINGS

The following is a summary of flows tributary to the wastewater treatment facility discharging into Mountain Brook:

EDUCATIONAL CENTER	POPULATION	UNIT FLOW, gal/cap.d	TOTAL FLOW, gpd
624 one bedroom apts.	1224	100	122,400
Central laundry	1224	10	12,240
Visitors	125/d	20	2,500
			137,140
HOTEL			
152 rooms (with kitchenettes)		150/rm.	22,800
Laundry, 5 machines		400/mech.	2,000
Total			161,940
Use 165,000 for design			

The domestic wastewater is assumed to have the following loadings, consistent with the "Recommended Standards for Sewage Works" (Ten States Standards)[1]:

	UNIT LOAD, lb/cap.d	ASSUMED POP	LOADING, lb/d
BOD_5	0.17	1500*	255
Suspended solids	0.20	1500	300

*1224 + 152 x 1.5 + 125 x 0.2 = 1477 Call 1500

APPENDIX B

DESIGN POPULATION, FLOWS, AND LOADS

	ORIGINAL DESIGN	REVISED DESIGN
Population	1,500	2,062
Flow, gallons per day	165,000	165,000
Average organic load, #BOD/d	255	351
Peak organic load, #BOD/d	255	596*
Average suspended solids load, #/d	300	176
Peak suspended solids load, #/d	300	298*

*WWTF design value

APPENDIX C

PATTERSON WWTF CALCULATIONS

SECONDARY TREATMENT

ORGANIC LOADING

Average influent organic loading = 351 lb/day (Appendix B)

Total peak influent organic loading = 596 lb/day (Appendix B)
(includes recycle)

Primary treatment BOD_5 removal = 25 percent
(without chemicals)

Total organic loading on secondary treatment = 0.75 x 596 = 447 lb/day
(includes recycle)

Total volume of aeration tanks (including existing flow equalization tanks and aerobic digesters) = 23,400 ft^3

Volumetric loading = 447/23.4 = 19.1 lb BOD_5/d/1000 ft^3

NITRIFICATION

Temperature for nitrification = 10° C

Specific nitrifier growth rate $\mu_{N(10°)} = 0.180\ day^{-1}$
(Soap and Detergent Assn., *Phosphorous and Nitrogen Removal from Municipal Wastewater*, 2nd ed., p. 13)

$k_{Nd} = 0.05\ day^{-1}$

Heterotrophic yield coefficient, a = 0.60
(estimate based on results from field observations)

$$SRT = \frac{1}{\mu_N - k_{Nd}} = \frac{1}{0.180 - 0.05} = 7.7$$

Safety factor = 2.5

APPENDIX C

SECONDARY TREATMENT (cont.)

$SRT_{design} = 2.5 \times 7.7 = 19.2$ days

Organic removal rate, $q_b = \dfrac{\left(\dfrac{1}{SRT_{design}}\right) + 0.05}{0.6} = 0.170 \dfrac{lb\ BOD\ removed}{lb\ MLVSS - day}$

(*EPA Design Manual for Nitrogen Control*, 1975, p. 4-10)

Hydraulic detention time (HDT) required $= \dfrac{S_o - S_1}{X_1 q_b}$

S_o = (Influent $TBOD_5$)(1 - primary removal) $= \dfrac{596}{.165 \times 8.34}(1 - .25) = 325$ mg/l

X_1 = MLVSS = 3000 mg/l

HDT required $= \dfrac{325 - 2}{3000 \times 0.170} = 0.633$ days $= \underline{15.2\ hrs}$

Available detention time (full ring conversion) $= \dfrac{23{,}400 \times 7.48 \times 24}{165{,}000} = \underline{25.5\ hrs} > 15.2$ OK

If only present flow equalization and aeration compartments used (aerobic digesters not converted):

Available detention time $= \dfrac{(23{,}400 - 4400) \times 7.48 \times 24}{165{,}000} = \underline{20.7\ hrs} > 15.2$ OK

If only present aeration compartments used (flow equalization tanks and aerobic digesters not converted):

Available detention time $= \dfrac{(23{,}400 - 10{,}200) \times 7.48 \times 24}{165{,}000} = \underline{14.4\ hrs} < 15.2$ Not OK

APPENDIX C

SECONDARY TREATMENT (cont.)

AIR REQUIREMENTS AND SUPPLY

Air Requirements:

Aeration Tanks:

$$596\,lb\ \text{BOD}/day \times \frac{1{,}500\ \text{SCF}}{lb\ \text{BOD}} \times \frac{day}{1{,}440\ \text{min}} = \quad 621\ \text{SCFM}$$

Flow Equalization Tanks:

3 SCFM/ft × 2 × 20ft of tank wall = 120 SCFM

Air Lift Pumps: 2 × 10 SCFM= 20 SCFM

Chemical Mixing:

5 locations @ 5 SCFM = 25 SCFM

Existing Aerobic Digestors (if used):

$$4{,}400\,ft^3 \times \frac{30\ \text{SCFM}}{1{,}000\,ft^3} = \quad 132\ \text{SCFM}$$

Total air required 918 SCFM

Aeration Air Supplied:

Assume one 20 hp and one 7.5 hp blower out of service:

Three 20 hp blowers @ 357 SCFM =	1,071 SCFM
Two 7.5 hp blowers @ 129 SCFM =	258 SCFM
Total air supplied	1,329 SCFM

Dufresne-Henry

FINAL
December 29, 2000

REPORT

FACILITY PLAN
Watchtower Educational Center
Wastewater Treatment Plant

Prepared for:

Watchtower Bible & Tract Society of New York, Inc.

By:

Dufresne-Henry Consulting Engineers, P.C.

September 7, 2000

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PROPOSED UPGRADE PLAN

EXECUTIVE SUMMARY

ES.1 EXISTING CONDITIONS

1. The Watchtower Education Center WWTP has been in operation since 1991 providing primary, secondary, AWT and tertiary stage treatments.
2. The facility is well maintained, properly staffed and managed, electronically supervised and regularly monitored for treatment compliance.
3. In over 9 years of operation, the plant has recorded only a few minor violations of SPDES Permit # NY - 0165778.
4. Due to a proposed reclassification of the WWTP's discharge receiving stream (Mountain Brook) from Class D to Class C by NYSDES and the requirements of the NYCDEP WR&R, Watchtower is complying with NYCDEP's Regulatory Upgrade Program. This program requires the WWTP to achieve 3 log and 4 log removal of giardia lamblia cysts and enteric viruses, respectively, along with more stringent phosphorus removal (0.5 mg/l) and seasonal ammonia limits (1.5 mg/l), and pH change from 6.0 - 9.0 to 6.5 - 8.5.

ES.2 COMPARISON OF FILTRATION TECHNOLOGY

1. Following the CUP recommendations, two (2) full facility upgrade filtration technology processes were evaluated: membrane filtration and dual sand filtration.
2. The evaluation included discussions with vendor representatives of U.S. Filter Corporation (Memcor, membrane filtration) and DualSand™ (2 stage upflow sand filtration) and receipt of complete process equipment packages including pricing.
3. Concurrently, a day of facility tours (of each technology) was held followed by a one-day design and evaluation workshop with Watchtower WWTP officials. Based on the workshop and tours, both the Owner and the Engineer agree that the DualSand™ technology is the best option because of the advantages to the facility.

4. The completion of the technology comparison was the development of site plan footprint layouts and opinions of capital construction costs, which bore out a 26% cost advantage using the DualSand™ technology.

ES.3 RECOMMENDED FILTRATION TECHNOLOGY

1. Based on the economical and technical considerations discussed in this report, we recommend the Continuous Backwash Upflow DualSand™ Filter (CBUDSF) treatment system be selected for implementation.
2. The recommended upgrade technology includes the following upgrade components:
   - New filter feed pump station.
   - 3 train DualSand™ filtration system with appurtenant support chemical feed and instrumentation.
   - Building addition to house new filtration system.
   - New reject water pump station.
   - Site work, utility relocation, and yard piping.

ES.4 ACKNOWLEDGEMENTS

This report was prepared under the direction of Mr. Ronald Gainer, P.E., Vice President, and under the technical oversight of Mr. Norton G. True, senior project advisor. Mr. Philip A. Leger, P.E. was the project manager, Mr. Jeffrey M. McDonald, P.E. was the design manager and Mr. Robert A. Urban was the senior process technician.

Dufresne-Henry Consulting Engineers P.C. wishes to acknowledge the assistance given them throughout the upgrade plan (PUP) phase and the input and review of this Facility Plan Report by the Watchtower Education Center personnel.

Section 1

SECTION ONE

INTRODUCTION

1.1 INTRODUCTION

The Watchtower Educational Center Wastewater Treatment Plant (Watchtower WWTP - SPDES # NY - 0165778) owned by The Watchtower Bible and Tract Society of New York, Inc. (WATCHTOWER) is located within the NYC Watershed Area in the Town of Patterson, NY and is, therefore, subject to the requirements noted within the "Rules and Regulations For The Protection From Contamination, Degradation and Pollution of the of the New York City Water Supply and its Sources" (herein referred to as WR&R) as well as other relevant State and local rules and regulations. In order for the plant to meet the WR&R requirements, the WWTP owner has entered into an agreement with the New York State Environmental Facilities Corporation (EFC) to upgrade the WWTP. The upgrades to the Watchtower WWTP are required solely by the WR&Rs (not SPDES requirements); are identified in the Preliminary Engineer's Scope of Work (PESW); and will be fully funded by the New York City Department of Environmental Protection (DEP).

WATCHTOWER subsequently entered into an agreement with Dufresne-Henry Consulting Engineers, P.C. (DHPC) to provide engineering services for the planning, design, construction, start-up and operation overview of the WWTP upgrade. DHPC is assisting WATCHTOWER with these engineering services and with other aspects of their agreement with EFC.

Per WATCHTOWER's agreement with EFC, a Conceptual Upgrade Plan (CUP) was previously prepared to evaluate alternatives which would enable the Watchtower WWTP to meet the WR&R requirements. The CUP recommended a full facility upgrade, rather than subsurface disposal or connection to another WWTP. The CUP was approved by EFC and DEP on June 7, 2000 subject to comments that will be addressed in this Facility Plan. Copies of the approval letters and comments from EFC and DEP are provided in Appendix A.

This Facility Plan is due to be submitted to EFC as an "approvable" report in September, 2000. The Plan will identify design criteria, will present a discussion of alternative technologies, will contain preliminary drawings and will serve as the basis for the final design.

Section 2

SECTION TWO

DESIGN CRITERIA

2.1 EXISTING CONDITIONS

The Watchtower WWTP is an extended aeration process plant which currently incorporates twin influent grinders, a manual/gravity grit removal channel, influent flow metering, equalization, primary clarification, activated sludge treatment (with aerobic digestion for sludge), single media sand filtration and UV disinfection. The plant has provisions for back-up power and full SCADA telemetering. The Watchtower WWTP was constructed in the late 1980's and has undergone one upgrade in 1995 to enhance its organic treatment. The plant discharges to the Mountain Brook, a Class D intermittent stream, located within the Watchtower Educational Center property boundary. In 10 years of operation, the plant has experienced only a few violations of the SPDES permit.

The Watchtower WWTP is regulated under SPDES permit # NY-0165778, a copy of which is contained in Appendix B. It is noted that this permit contains future final effluent limitations due to the NYC Watershed Rules and Regulations. This includes achieving 99.9% (3 log) removal and/or inactivation of giardia lamblia cysts and 99.99% (4 log) removal and/or inactivation of enteric viruses, along with stringent phosphorous removal (0.5 mg/l), seasonal ammonia limitation (1.5 mg/l), dechlorination (0.1 mg/l), and pH change from 6.0 - 9.0 to 6.5 - 8.5.

The Watchtower WWTP treats domestic sewage emanating from an educational center which includes: classrooms, cafeterias, dormitories and support (General Services) operations. The average daily flow is about 90,000 gpd, while the permitted flow is 165,000 gpd. Due to the age and type of collection system, inflow and infiltration (I/I) is of minimal concern.

A review of the plant records during 1998 and 1999 indicates 100% compliance with major SPDES effluent limits. The staff of the plant have developed excellent process control measures and the effluent

quality data for the two year evaluation period is a reflection of these efforts. The 1998 and 1999 operations data has been summarized with the yearly averages compared to design and discharge permit criteria. This data is presented in Table I and Table II contained in Appendix C.

2.2 DESIGN CRITERIA

Design of the Watchtower WWTP Upgrade will incorporate the items set forth in the Preliminary Engineer's Scope of Work. As noted in the PESW, the Regulatory Upgrade will include the installation of, but will not be limited to, the following: Micro filtration or approved equivalency; enhanced phosphorus removal capability to 0.5 mg/l; full back-up power (already provided); backup disinfection with automatic startup; sand filtration; and recording flow meter (already provided).

The regulatory criteria used for the upgrade will follow the guidelines set forth in the following publications:

1. "Design Standards for Wastewater Treatment Works, Intermediate Sized Sewerage Facilities, New York State Department of Environmental Conservation" (1988) also referred to as DEC 1988 Standards);
2. "Recommended Standards for Wastewater Facilities," Great Lakes--Upper Mississippi River Board of State Public Health and Environmental Managers (1990) also referred to as Ten-State Standards);
3. The NYC Watershed Rules and Regulations (WR&R);
4. Relevant Sections within the Upgrade Contract, specifically Request For Proposal Section 3 - Standard Technical Specifications; and
5. Information and Technical Bulletins issued by the NYS Environmental Facilities Corp. (EFC) and the NYC Department of Environmental Protection (NYCDEP).

In addition to the regulatory criteria, during an initial design workshop, the WWTP plant operations overseer and facilities staff and the DHPC design team, identified the following design issues and concerns:

1. Minimize footprint, find adequate space within existing facility site;
2. maximize simplicity;
3. maintain and tie into existing U.V. system;
4. maintain plant operations during construction;
5. minimize recycle/side-stream flows (hydraulic and organic loads);
6. maintain setback from receiving stream;
7. minimize maintenance costs;
8. consideration of future upgrades if required;
9. disinfection byproducts;
10. operational flexibility;
11. minimize operations labor efforts;
12. minimize operator training and staffing expertise requirements;
13. provide adequate space around equipment in building;
14. provide adequate wet well size (existing may be inadequate for additional recycle flows);
15. eliminate any abandoned unit process components;
16. aesthetics: compatible w/existing architecture; minimize height.

Specific effluent criteria used as the design requirements for the proposed upgrade are as follows:

1. Flow = 0.165 MGD 30 day arithmetic mean.
2. CBOD = 5.0 mg/L maximum.
3. TSS = 10..0 mg/L maximum.
4. Fecal coliform = 30 day geometric mean not-to-exceed 200/100 ml.
5. pH = 6.5 to 8.5 su.
6. Settleable solids = 0.1 ml/L maximum.
7. Ammonia = 2 mg/L maximum (1.5 mg/L maximum; June 1 to October 31).
8. Dissolved oxygen = 7.0 mg/L minimum.

9. Phosphorus = 0.5 mg/L 30 day average.
10. Chlorine residual: 0.2 mg/L minimum in contact tank; 0.1 mg/L maximum in effluent.
11. Turbidity 0.5 NTU 95% of monthly readings; 5.0 NTU maximum.
12. Giardia lamblia cysts 99.9% removal; Enteric viruses 99.99% removal.

Section 3

SECTION THREE
EVALUATION OF ALTERNATIVES

3.1 INTRODUCTION

There are two major design issues to consider in this WWTP Upgrade: (1) selection of a treatment technology to meet the WR&R requirements for giardia and enteric virus removal; and (2) location of the new treatment facility within the existing WWTP site. These are discussed separately in this Section of the Facility Plan.

3.2 COMPARISON OF FILTRATION TECHNOLOGY

The DHPC design team, along with the WWTP operator and other representatives of the owner evaluated both the micro filtration and DualSand™ system filtration (CBUDSF) technologies. These two processes are NYCDEP approved alternative filtration technologies which will meet the WR&R requirements for giardia and enteric virus removal. The evaluation included site visits to observe these systems in operation, and then a follow up design workshop to discuss the observations and evaluate other design application issues and owner concerns. Site visits were made to a water treatment facility in Stamford, NY (accompanied by DSS Environmental, Inc.) to observe the DualSand™ system and a WWTP in Margaretville, NY (accompanied by NYC DEP plant operator) to observe a Memcor micro filtration system.

Following the site visits and the design workshop, the advantages and disadvantages of the two technologies were summarized as follows:

Micro filtration:

Advantages

1. Provides a physical barrier that will always provide the required pollutant removals.
2. Has a track record for wastewater treatment.
3. No chlorine feed requirement; no related O&M problems, no "disinfection byproducts."
4. Multiple small treatment modules provides operational flexibility.

Disadvantages

1. Complex system to maintain - higher labor and material costs than DualSand™ process.
2. Higher recycle/side-stream flows.
3. Higher capital costs.
4. More operator training required.
5. Requires a pre-filter and careful operation of upstream process to prevent "blinding" and effluent bypassing.
6. Requires new sand filters or similar; this is an additional unit process.
7. Membrane must be operational at all times, so continuous recirculation is required during low flow periods.
8. Large footprint reduces siting flexibility.

DualSand™ System:

Advantages

1. Less complex, less costly and simpler to operate than micro filtration process.
2. Lower capital costs.
3. Lower recycle/side-stream flows.
4. Smaller footprint allows greater siting flexibility.
5. Single stage unit operation does not require pre-filter.
6. More forgiving of "spike" loadings; difficult to "blind" and bypassing unlikely.
7. Can be stopped and restarted automatically with no special precautions or pre-treatment.

Disadvantages

1. "First application in watershed Regulatory Program;" short track record.
2. Requires chlorine feed system: disinfection byproducts, related O&M problems.
3. Multiple small units for operational flexibility not a feasible option.
4. Proprietary, single source of supply.

A significant drawback for use of the Micro filtration system is the need to replace the existing sand filtration units. At present, only two (2) sand filters are available. In plants with an SPDES permitted surface discharge greater than 50,000 gpd, there must be a minimum of three (3) sand filters, each rated to handle one-half of the full plant flow. In addition, the filters must meet the *Design Standards for Wastewater Treatment Works, Intermediate Sized Sewerage Facilities,* NYSDEC (1988). Table 9 of the referenced Design Standards provides a listing of minimum media depth, which ranges from 32 inches for multi-media to 48 inches for single media filters. The existing filters at WATCHTOWER provide only 10 inches of single media depth, which is insufficient to protect the micro filters from blinding and being forced into bypass mode.

In addition to the spatial requirements for the micro filtration system, the need for three (3) appropriately sized sand filtration units greatly increases the building footprint needed for this alternative. Observation of the physical layout of the micro filtration facility in Margaretville confirmed this conclusion.

The two technologies evaluated are further represented by process flow schematics in figures 3.1 and 3.2.

Based on the advantages and disadvantages, along with the design issues identified and concerns of the WWTP operator, the DualSand™ system was rated superior for the Watchtower application. The over-riding reasons for preferring the DualSand™ system are that it is a smaller, simpler, lower capital cost system which should be easier and less expensive to maintain and operate and it has a demonstrated ability to meet the WR&R requirements.

3.3 FACILITY SITING

The possible physical locations available for the new filter building were reviewed with the plant operator at the WWTP site. It was confirmed that the preferred location was immediately adjacent to the control building. This site was selected because it: would minimize site disturbances, allow sharing of the control building mechanical and electrical systems, minimize aesthetic impacts and reduce capital and O&M costs. This location needs to be reviewed in more detail in regards to potential conflicts which could impact maintenance of plant operations during construction. The second preferred location was into the side of the sloped embankment northeast of the control building and east of the sludge mechanical de-watering building. Figure 3.3 depicts the alternative siting locations.

The required minimum building footprint for the DualSand™ Filtration System is approximately 35 feet by 55 feet or 1,925 sq. ft. This footprint can be set in the preferred location adjacent to the existing control building.

Building requirements for a combined sand filtration and membrane micro filtration facility is approximately 50 feet by 75 feet or roughly 3,750 sq. ft. This footprint is too large to locate adjacent to the existing control building without major modifications to the site road network. Adequate space does appear to be available at the second preferred location as shown on figure 3.3.

The hillside location presents additional structural considerations, including the need for a retaining wall and/or sheeting during construction. This location has higher siting costs as a result, as well as additional utility relocation costs due to the conflict with several utility piping systems.

3.4 COST COMPARISON OF ALTERNATIVES

Detailed cost analysis are presented here for only the regulatory upgrade construction cost components of the two alternatives developed. Total project costs are developed further for the selected alternative in Section Six.

As presented in Table 3.4 below, construction of a micro filtration facility in compliance with all regulatory standards is estimated to cost $2,943,600. A complying DualSand™ System is estimated to cost $2,338,000. This results in a comparative 26% capital cost advantage for the DualSand™ System. Based upon the comparative O&M cost in Table 3.4, operation and maintenance costs will also be less for the DualSand™ System. O&M cost figures for the selected alternative is also presented in Section Six, Table 6.2.

TABLE 3.4 COST COMPARISON

CAPITAL COSTS

WATCHTOWER WWTP FACILITY UPGRADE		
ITEM	MICRO FILTRATION	DUAL SAND FILTRATION
EXCAVATION	$75,000	$30,000
MICRO. OR EQUIVAL.	$825,000	$1,005,000
SAND FILTRATION [1]	$210,000	$0
BLDGS./FOUND.	$338,000	$174,000
MECHANICAL/HVAC	$60,000	$60,000
PUMPING STATION	$100,000	$100,000
INSTRUMENTATION	$50,000	$50,000
CLEARWELLS [2]	$50,000	$0
MUDWELL/REJECT WATER	$25,000	$25,000
BACKUP DISINFECTION [3]	$25,000	$0

[1] Per NYC DEP Equivalency determination, no sand filter is required in front of the DualSand™ System.

[2] No clearwells are required for the DualSand™ System.

[3] Cost of redundant disinfection equipment is included with the DualSand™ System Proposal.

ELECTRICAL WORK	$85,000	$60,000
PIPING/VALVING	$100,000	$40,000
SITE WORK	$190,000	$150,000
GENERAL CONDITIONS	$320,000	$254,100
CONTINGENCY @20%	$490,600	$389,900
COMPARABLE COSTS	$2,943,600	$2,338,000

O&M COSTS (ANNUAL)

WATCHTOWER WWTP FACILITY UPGRADE		
ITEM	**MICRO FILTRATION**	**DUAL SAND FILTRATION**
LABOR	$10,400.00	$8,220.00
ELECTRICAL	$2,794.00	$833.00
MAINTENANCE	$4,390.00	$1,323.00
FUEL	$2,733.00	$2,733.00
CHEMICALS	$4,160.00	$7,557.00
SERVICE CONTRACTS	$7,800.00	$4,500.00
EQUIPMENT	$1,323.00	$1,323.00
LAB TESTING	$0.00	$0.00
TOTAL	$33,600.00	$26,489.00

PRESENT WORTH		
I @ 6%, n= 20-YEAR	MICRO FILTRATION	DUAL SAND FILTRATION
Total Present Worth = Capital Costs + [O&M Costs x (11.47)] (P/A, 6%, 20 = 11.47)	$3,329,000	$2,642,000

ELECTRICAL WORK	$85,000	$60,000
PIPING/VALVING	$100,000	$40,000
SITE WORK	$190,000	$150,000
GENERAL CONDITIONS (OH&P)	$320,000	$254,100
CONTINGENCY @20%	$490,600	$389,900
COMPARABLE COSTS	$2,943,600	$2,338,000

O&M COSTS (ANNUAL)

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ITEM	**MICRO FILTRATION**	**DUAL SAND FILTRATION**
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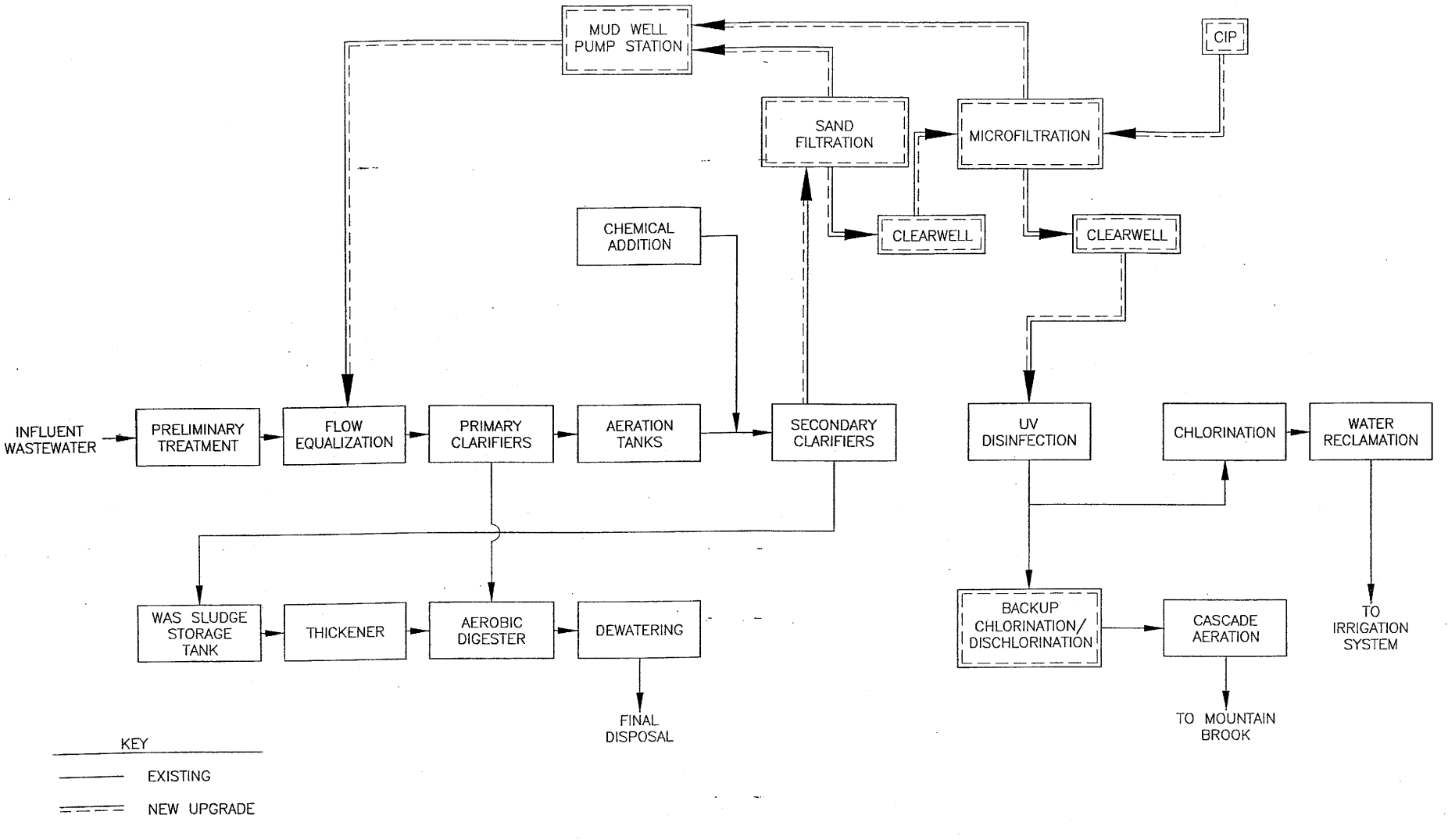
TOTAL	$33,600.00	$26,489.00

PRESENT WORTH		
I @ 6%, n= 20-YEAR	MICRO FILTRATION	DUAL SAND FILTRATION
Total Present Worth = Capital Costs + [O&M Costs x (11.47)] (P/A, 6%, 20 = 11.47)	$3,329,000	$2,642,000

3.5 RECOMMENDED FILTRATION TECHNOLOGY

Based on the economical and technical considerations previously stated, we recommend the Continuous Backwash Upflow DualSand™ Filter (CBUDSF) treatment system be selected for implementation. Conceptual Plans and Specifications are presented in Section Four and Five of this report. A copy of the proposal submitted by DSS Environmental, Inc. for consideration is contained in Appendix E to this report. Also included is the Memcor membrane filter proposal from US Filter Corporation.



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WATCHTOWER EDUCATIONAL CENTER
WASTEWATER TREATMENT FACILITY, PROPOSED UPGRADE PLAN

MICROFILTRATION ALTERNATIVE
PROCESS SCHEMATIC
FIGURE 3.1

PATTERSON NEW YORK

Project No.	7600006.0
Proj. Mgr.	P.LEGER
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Date	AUG 2000
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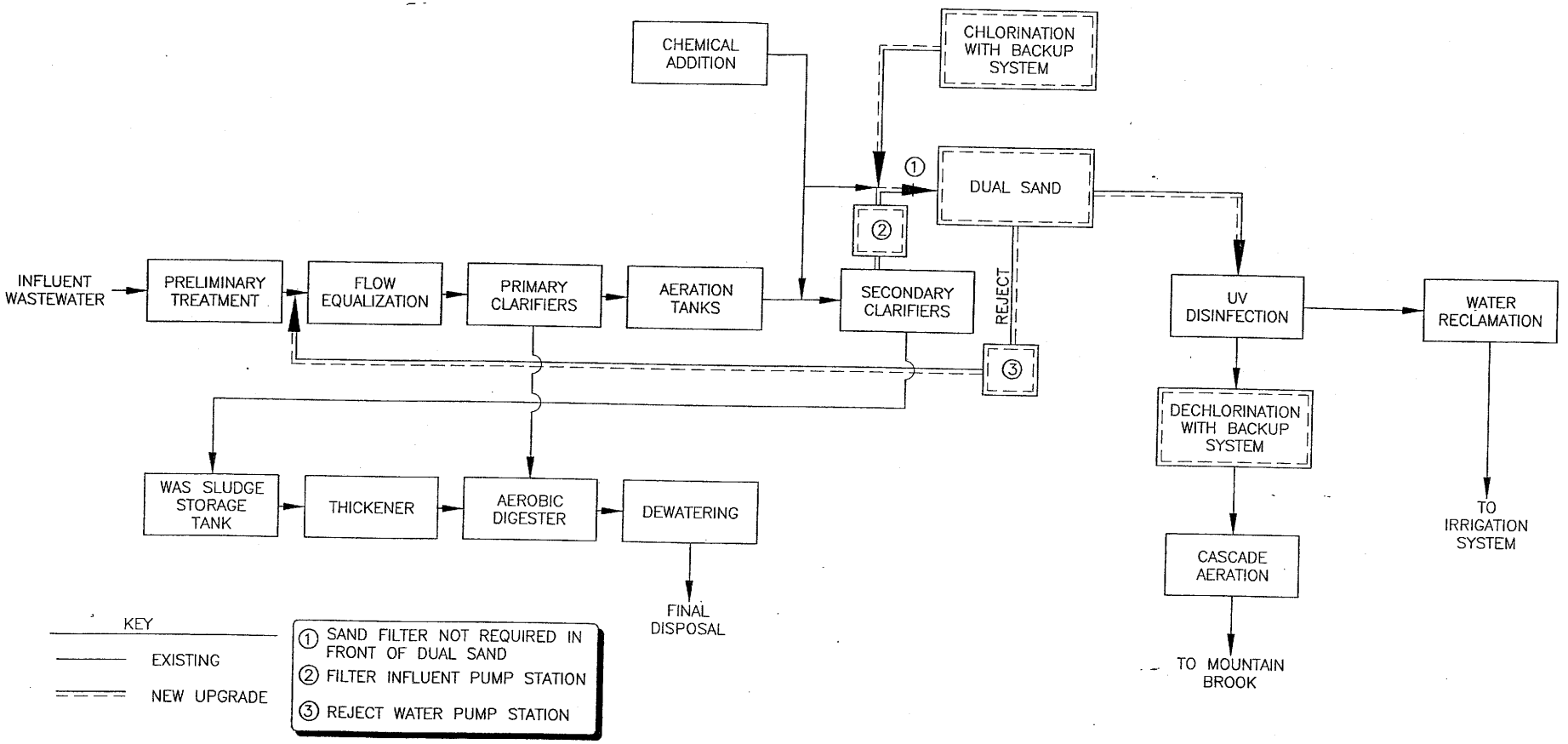

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DUAL SAND FILTRATION ALTERNATIVE
PROCESS SCHEMATIC
FIGURE 3.2

PATTERSON NEW YORK

Project No.	7600006.02
Proj. Mgr.	P.LEGER
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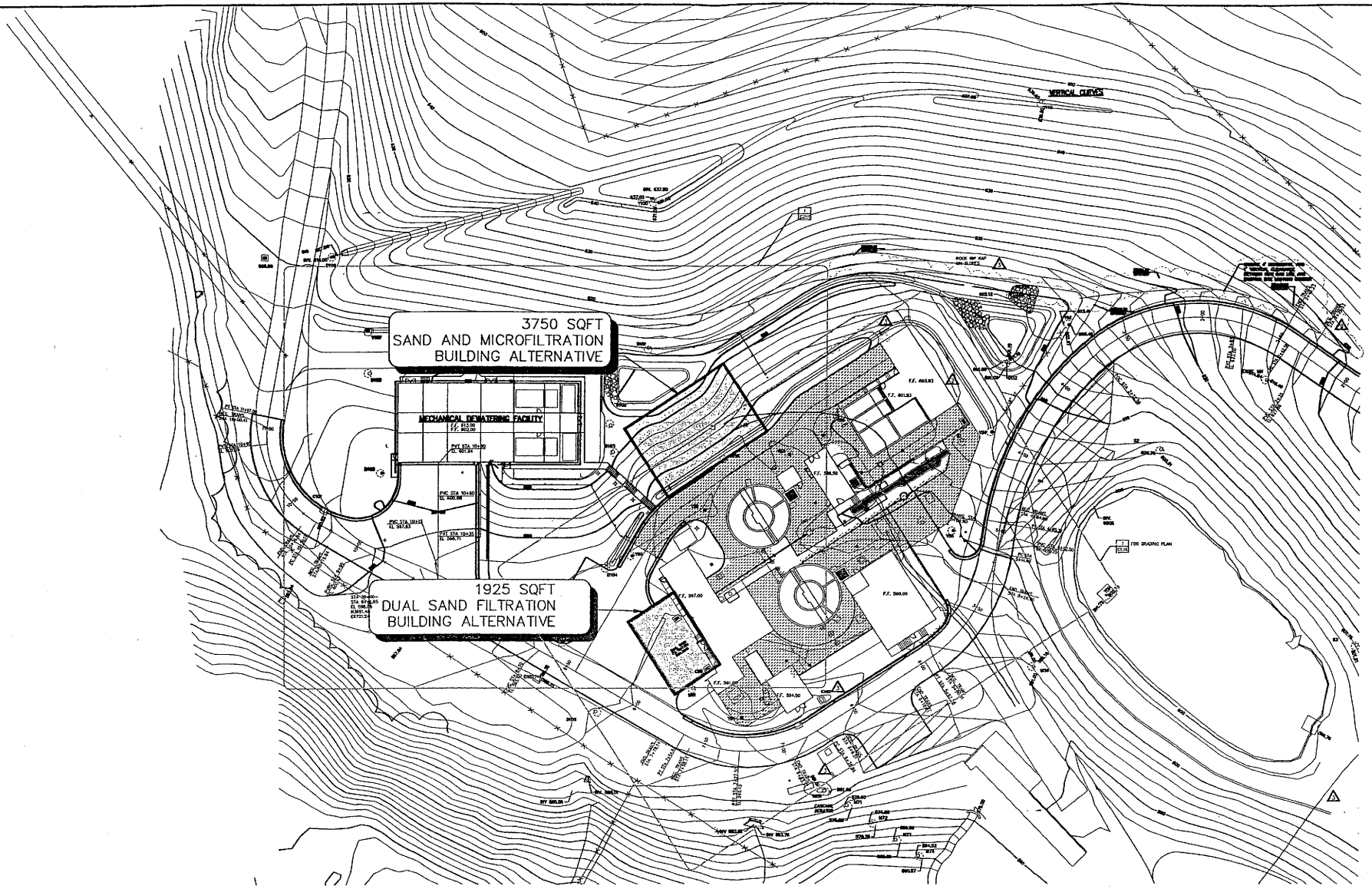

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FILTRATION ALTERNATIVES
TOPOGRAPHIC PLAN
FIGURE 3.3

PATTERSON NEW YORK

Project No.	700006.02
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Date	
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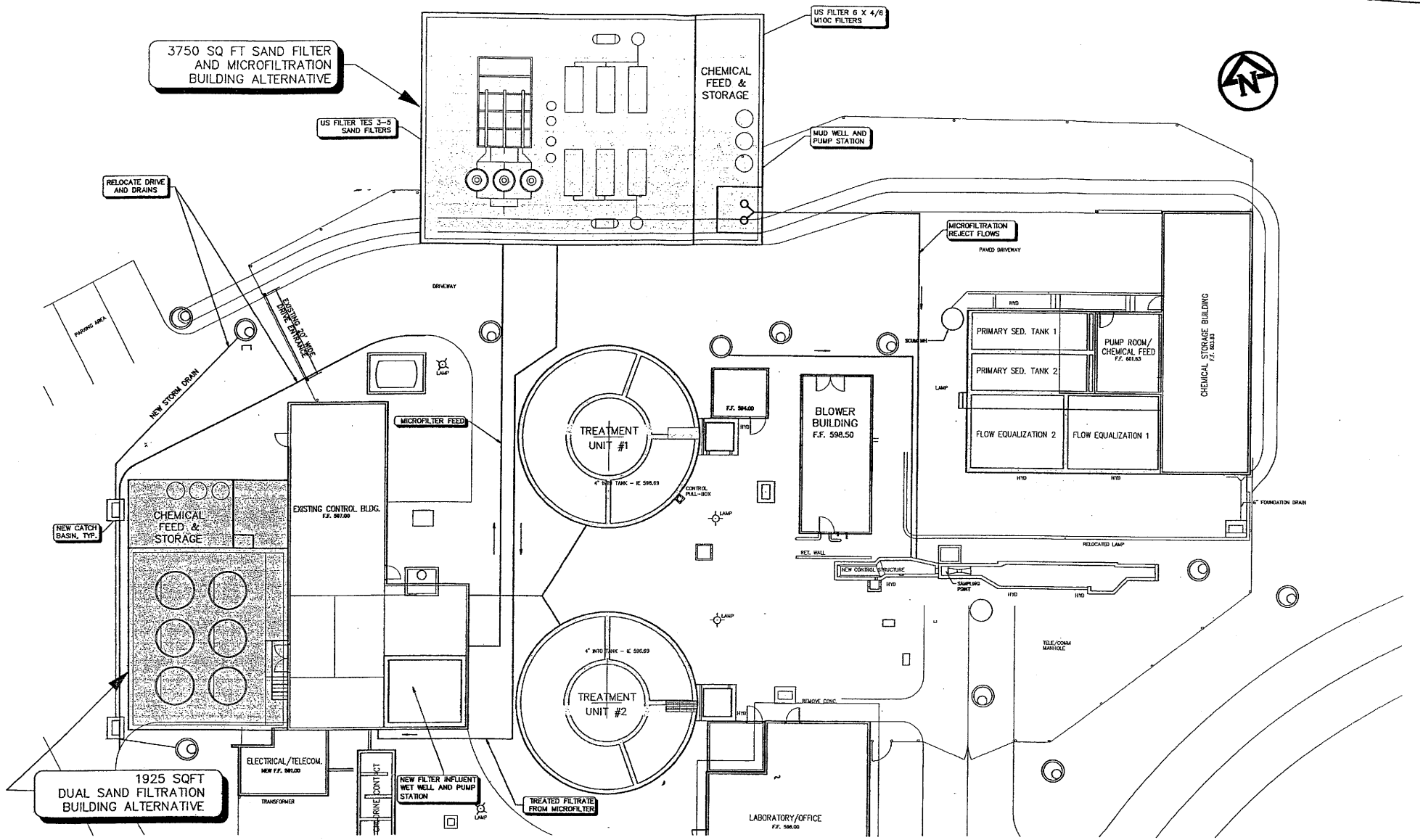

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WATCHTOWER EDUCATIONAL CENTER
WASTEWATER TREATMENT FACILITY, PROPOSED UPGRADE PLAN

FILTRATION ALTERNATIVES LOCATION PLAN FIGURE 3.4

PATTERSON NEW YORK

Project No.	760000.02
Proj. Mgr.	P.LEGER
Scale	NONE
Date	AUG 2000
B	3.4

Section 4

SECTION FOUR

PRELIMINARY DESIGN

4.1 PROPOSED DESIGN DRAWINGS

The following conceptual design drawings are provided as a separate attachment:

1. Site Plan
2. Yard Piping Plan
3. DualSand™ Process Piping Plan
4. DualSand™ Filter Building Plan
5. DualSand™ Filter Building Sections
6. DualSand™ Filter Building Elevations
7. Electrical/Mechanical/HVAC Building Systems Coordination
8. Process and Instrumentation Diagram

4.2 FUNCTIONAL DESCRIPTION

Proposed improvements to the Watchtower Education Center WWTP will consist of the following:

1. Modifications to the secondary effluent line to allow diversion to the new filtration system.
2. Construction of a new duplex pumping station located in the existing filter room to feed the new dual sand filter units.
3. Construction of new 1,925 sq. ft. filter building addition including structural building systems, mechanical, process piping, HVAC and electrical support facilities.
4. Installation of a vendor supplied and installed three (3) Train DualSand™ Filtration System, including monitoring equipment, automated controls and chemical feed systems.
5. Modifications to the influent line of the UV system to tie in treated filtrate.
6. Installation of dechlorination feed pumps along with DualSand™ chlorine feed system.

7. Installation of reject water pump station located in new filter building and tying in to existing backwash force main.
8. Site work improvements to modify the access to existing and new buildings, relocate storm drains, construct yard piping, and tie in building drains.
9. Installation of operations support platforms and stairways

The design will allow for the continued operation of the existing wastewater filtration system during construction of the DualSand™ system with the exception of a period of temporary influent pumping during the switch over to the new pump station. Modifications to the secondary effluent line will involve the installation of valves and piping to allow diversion to the new filtration system influent wet well.

Construction of a new influent pumping station is needed to feed the new DualSand™ filter units. The existing pump station does not have adequate volume to allow for flow pacing to the new filter units. The pump station wet well will be a cast concrete unit installed in the south end of the existing filter room and will utilize duplex pumps. The pumps will be controlled by variable frequency drives (VFD) to allow flow pacing with the secondary influent flow. The existing sand filters will be demolished and removed prior to installation of the new influent pump station.

All chemical storage feed and mixing equipment will be contained in the new filter building addition. Chemical injection will be followed by a static mixer and flow meter. Also located in this room will be the air lift compressor.

Chemicals proposed for the new filtration facility include sodium hypochlorite for disinfection and sodium metabisulfite for dechlorination. An aluminum based coagulant will also be added prior to filtration for enhanced phosphorus removal. Aluminum based primary flocculent will continue to be added for phosphorus removal in the secondary process to provide an additional barrier and ensure secondary effluent quality. The result will assure compliance with the more stringent phosphorous limits and will protect the quality of the water being discharged to the watershed.

Construction of a new 1925 sq. ft. filter building will be located immediately adjacent and common-walled to the existing control building. An interior access will be provided through the existing double doors located adjacent to the old loading dock and via the stairway to the UV room entrance. The loading dock will be demolished. Two new exterior access doors will be constructed.

Installation of three (3) DualSand™ Filtration Systems Trains will be located within the new filter building. Monitoring and controls will be located within the new building process lab area. The DualSand™ system will be installed largely in accordance with the proposal of August 14, 2000 by Siewert Equipment Co. (DualSand™ Representative), and appended to this report as Appendix E. Access to the filter units will be provided by stairways and elevated walkways for the operator's operational convenience and safety. Flow meters, turbidimeters, chemical feed systems, a particle counter and associated alarm telemetry will be provided and interconnected with the existing plant SCADA system.

A new duplex reject water pump station will be constructed under the chemical room area of the new filtration building. Reject flows will be pumped to the existing plant influent equalization basin (EQ) for flow equalization and treatment. Appendix G

Treated filtrate from the DualSand™ process will be connected to the influent line of the UV system. The WR&R require that all WWTPs located in the watershed be provided with backup disinfection units. EFC Technical Bulletin No. 2 provides that facilities with UV disinfection as their current primary form of disinfection shall use either UV disinfection, sodium hypochlorite or chlorine gas in their backup disinfection system. It is the desire of the Watchtower Education Center to continue to rely on the UV system as the primary disinfection system. The DualSand™ unit vendor proposal includes a back-up sodium hypochlorite feed system. Both the hypochlorite and UV disinfection systems will have automatic startup capability.

Use of sodium hypochlorite will require the installation of dechlorination equipment. There will be no modifications required to the existing unused dechlorination chamber. A second chlorine residual analyzer will also be provided to verify compliance with permit requirements at the final discharge.

Site work improvements to modify the existing parking, relocated storm drains, construct new curbing, and tie in building drains are necessary due to the location of the proposed new filter building . Building perimeter yard and roof drains will also need to be relocated. Storm drainage changes are indicated on the Preliminary Design Drawing No.#2 Yard Piping Plan of the Proposed Upgrade Plans. No change in site stormwater runoff is anticipated, as the impermeable area has not changed.

4.3 INSTRUMENTATION

Instrumentation and alarm equipment proposed for the upgrade includes the following:

1. Filter influent wet well level sensor and transmitter.
2. Filter influent turbidimeter.
3. Filter influent flow meter.
4. Filter No. 1, No. 2 & No. 3 flow meters.
5. Filter air flow rate controllers (6) and gauges (6).
6. Filter No. 1, No. 2 & No. 3 filtrate turbidimeters.
7. Filtered water turbidimeter, particle counter and residual chlorine analyzer.
8. Post dechlorination residual chlorine analyzer.

The output of these electronic devices shall be continuously recorded at a new filter room control module and transmitted to the existing plant SCADA system for alarm functions. Instrumentation systems are intended to meet the requirements of NYCDEP Technical Bulletin No. #3 Instrumentation. Accordingly, the following systems will be provided with alarms that shall be transmitted to the plant SCADA system with around the clock operator paging, so that an on-site response will be initiated immediately:

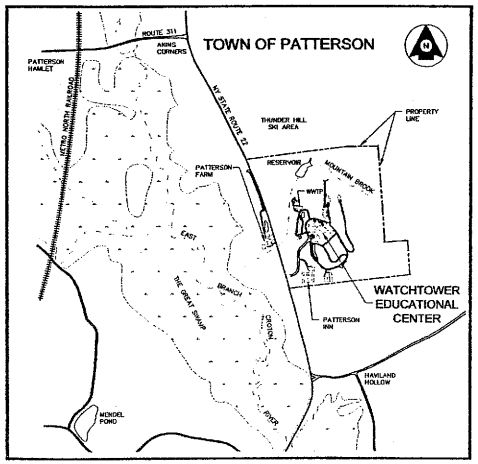
1. Filtration - high turbidity, high particle count, and auto shutdown.
2. Disinfection system - low solution level, no flow, low residual chlorine, low UV intensity.

3. Influent and reject water pumping stations - high liquid level.
4. Filter influent flow meter - no flow.
5. Power failure.

LOCATION MAP

WATCHTOWER EDUCATIONAL CENTER
WASTEWATER TREATMENT PLANT
PROPOSED UPGRADE PLAN

TOWN OF PATTERSON, NEW YORK
PUTNAM COUNTY, NEW YORK



VICINITY MAP
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INDEX OF DRAWINGS

DRAWING	TITLE
1	SITE PLAN
2	EXISTING YARD PIPING PLAN - PROPOSED FACILITIES
3	DUAL SAND FILTER - PROCESS PIPING PLAN
4	NEW DUAL SAND FILTER BUILDING - PLAN
5	NEW DUAL SAND FILTER BUILDING - SECTIONS
6	NEW DUAL SAND FILTER BUILDING - ELEVATIONS
7	NEW DUAL SAND FILTER BUILDING - HEATING & VENTILATION PLAN
8	PROCESS AND INSTRUMENTATION DIAGRAM

REGULATORY UPGRADE PROGRAM
NYC DEP LOG NO. 7905

AUGUST • 2000

Consulting Engineers

OFFICES:
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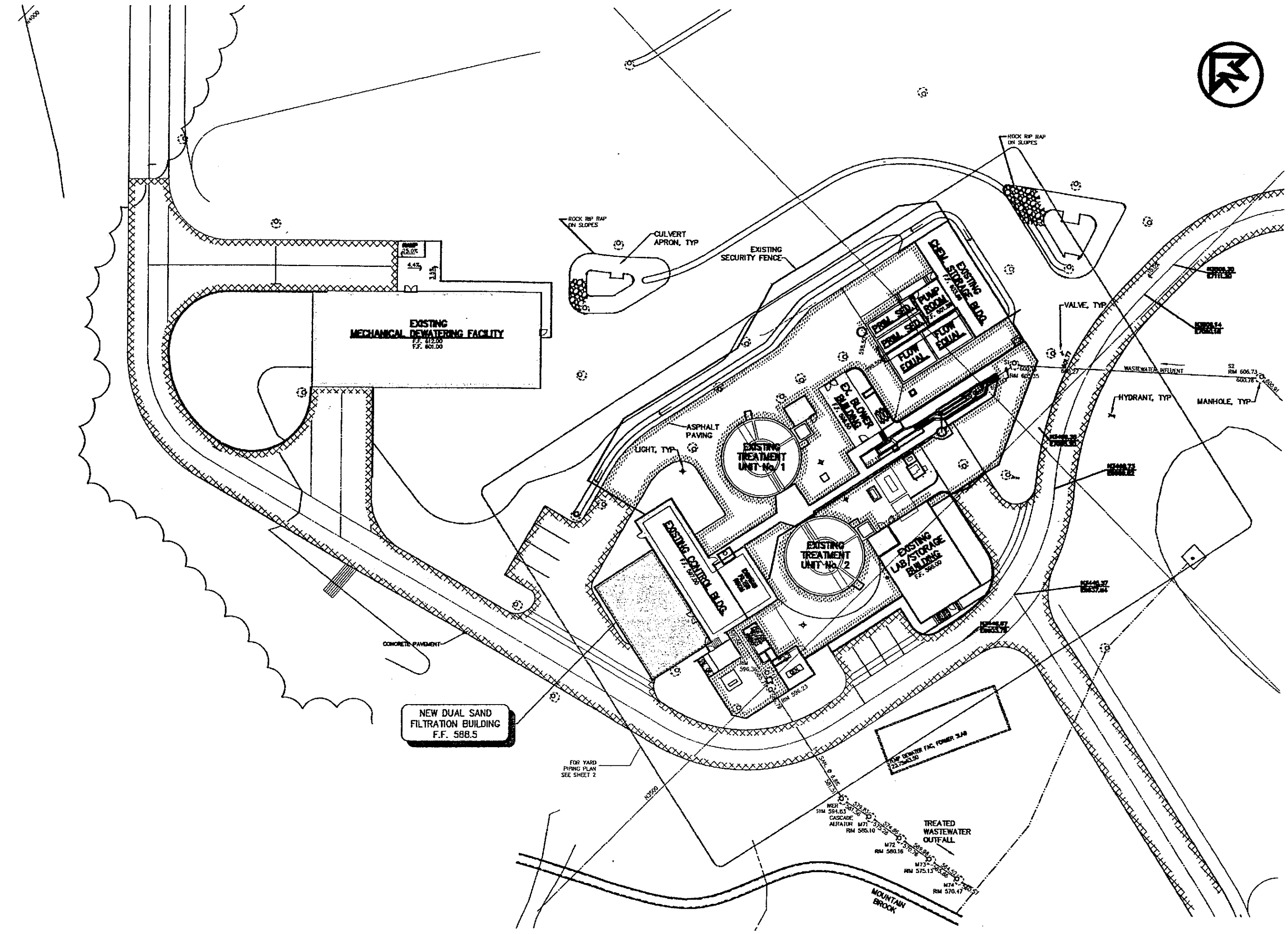

SITE PLAN

SCALE 1" = 20'

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WATCHTOWER EDUCATIONAL CENTER
WASTEWATER TREATMENT FACILITY
PROPOSED UPGRADE PLAN

SITE PLAN

Project No.	7600006.02
Proj. Manager	P.LEGER
Proj. Designer	J.McDONALD
Drawn By	D.HARRINGTON
Checked By	J.McDONALD
Scale	AS SHOWN
Approved	J.McDONALD

1

Sheet 1 of 8

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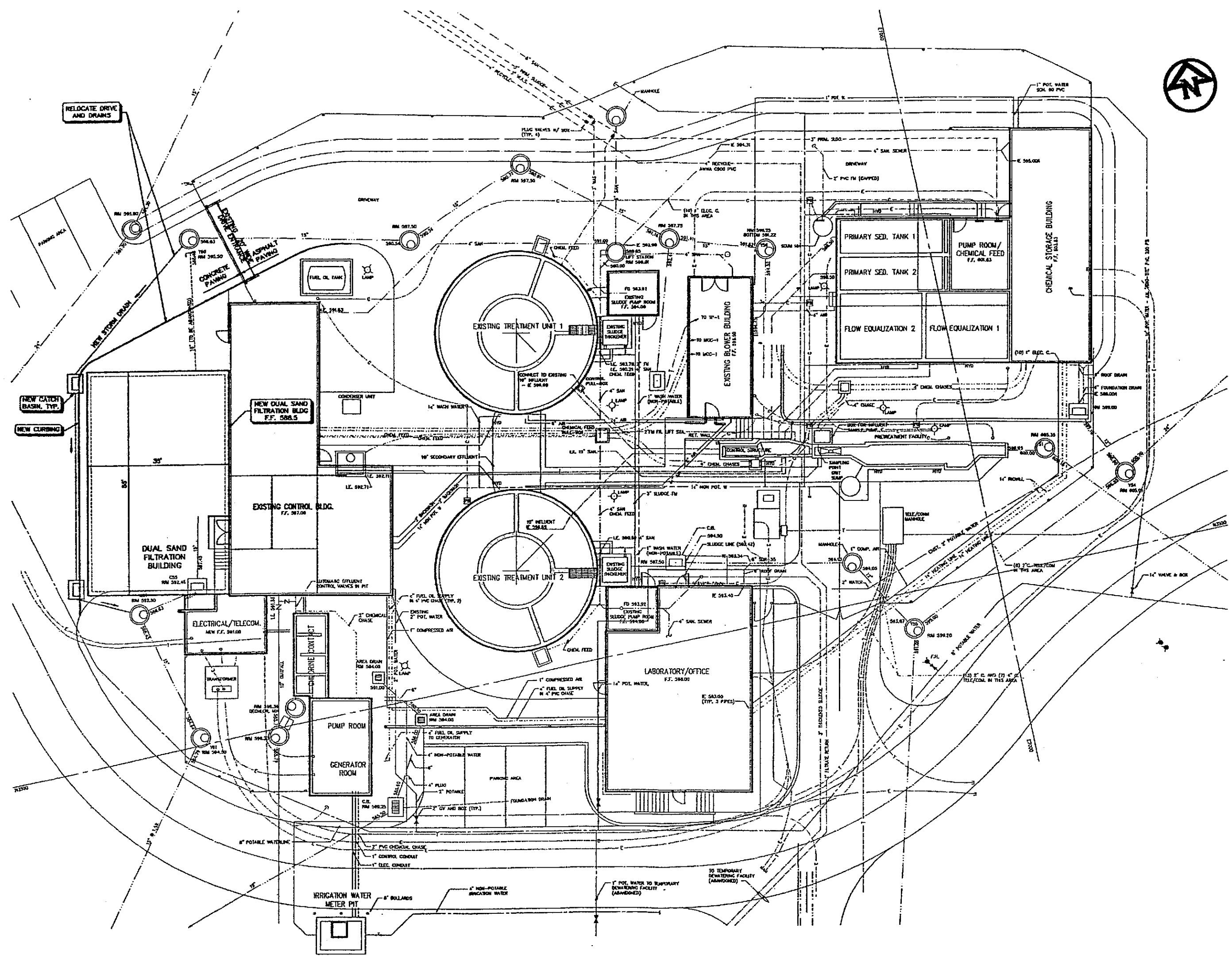

YARD PIPING PLAN

SCALE: 1" = 100'

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WATCHTOWER EDUCATIONAL CENTER
WASTEWATER TREATMENT FACILITY
PROPOSED UPGRADE PLAN

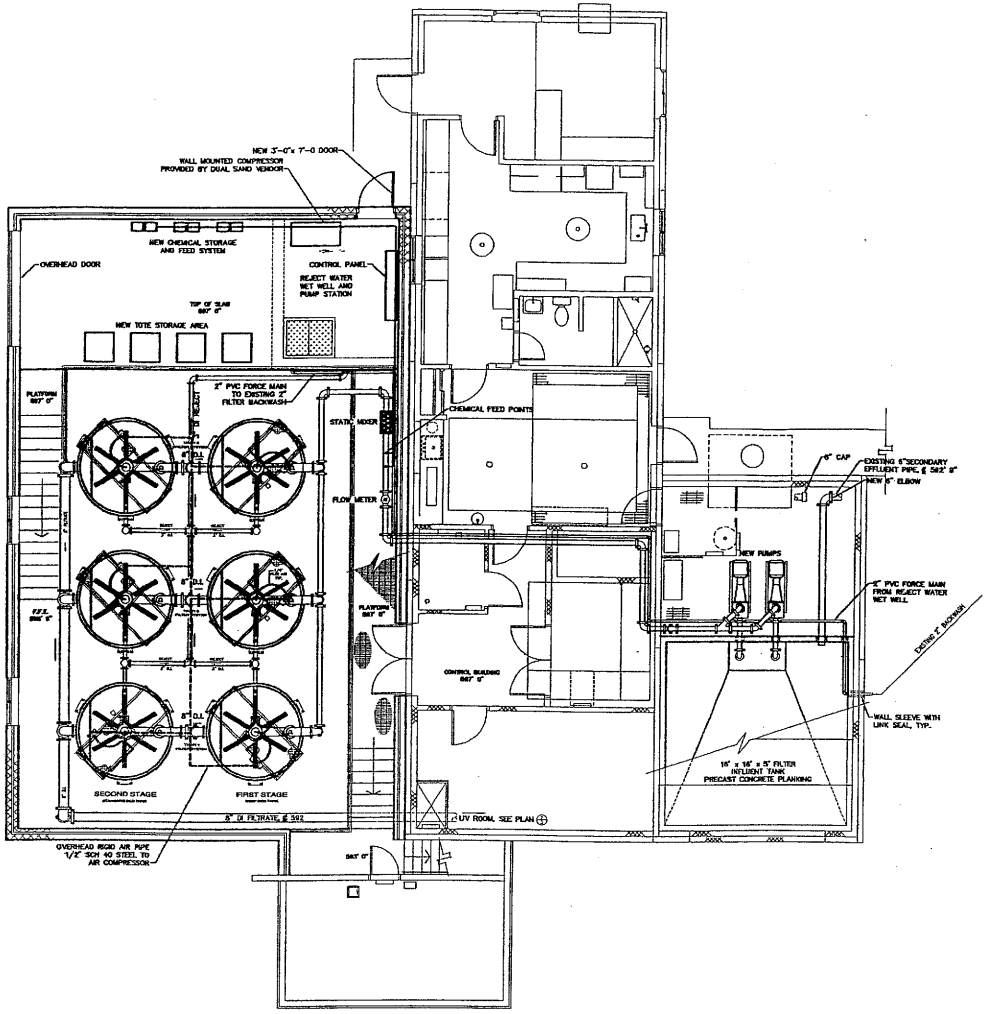
EXISTING YARD PIPING PLAN/
PROPOSED FACILITIES

Project No.	7600008.02
Proj. Manager	P.EGER
Proj. Designer	J.McDONALD
Drawn By	D.HARRINGTON
Checked By	J.McDONALD

2

Sheet 2 of

7600008.0



PLAN DUAL SAND FILTER TANKS (1/3)
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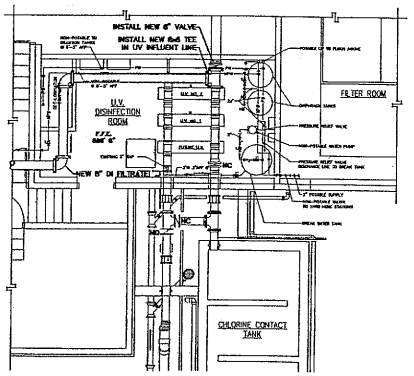

PLAN UV DISINFECTION ROOM (2/3)
SCALE: 1/4"=1'-0"

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WATCHTOWER EDUCATIONAL CENTER
WATERTOWN, NEW YORK FACILITY
PROPOSED UPGRADE PLAN

DUAL SAND FILTER
PROCESS PIPING PLAN

Project No.	7600006.02
Proj. Manager	P.KLOSS
Proj. Designer	J.MACDONALD
Drawn By	D.WASHINGTON
Checked By	J.MACDONALD
Date	AS NOTED
Submitted	J.MACDONALD

3

Sheet 3 of 6
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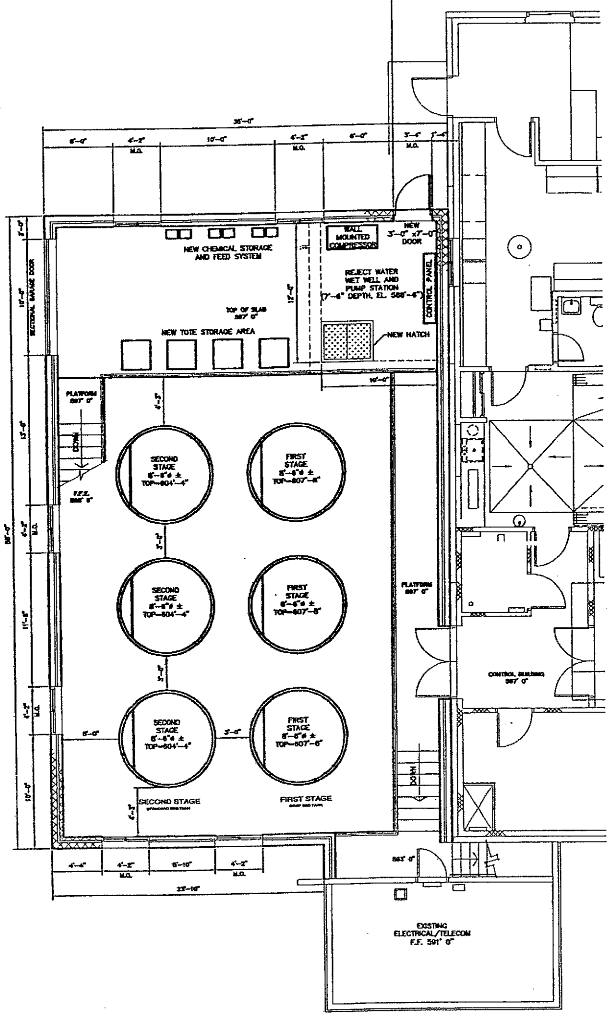

PLAN DUAL SAND FILTER TANKS (1/4)
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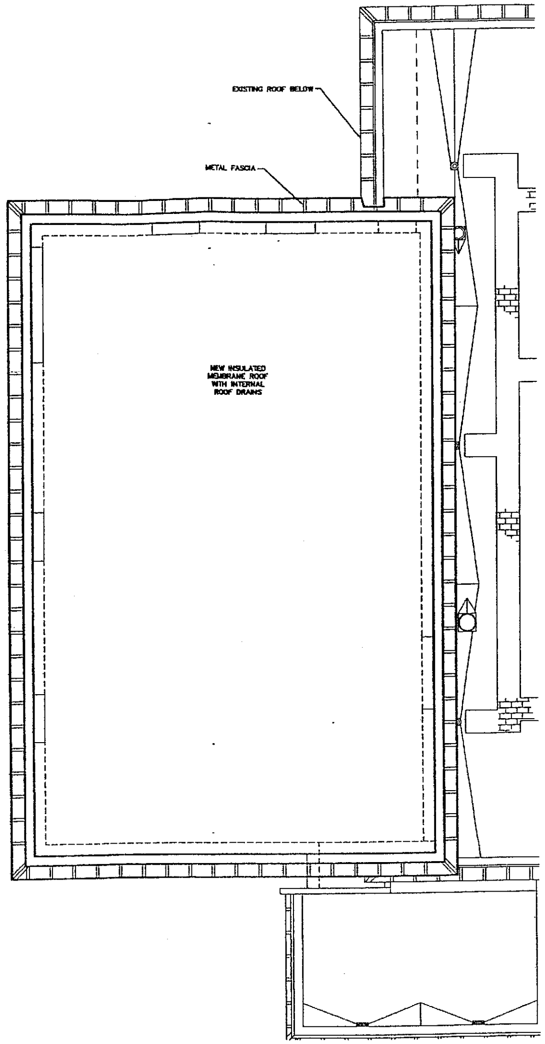

PLAN ROOF ON NEW DUAL SAND FILTER BUILDING (2/4)
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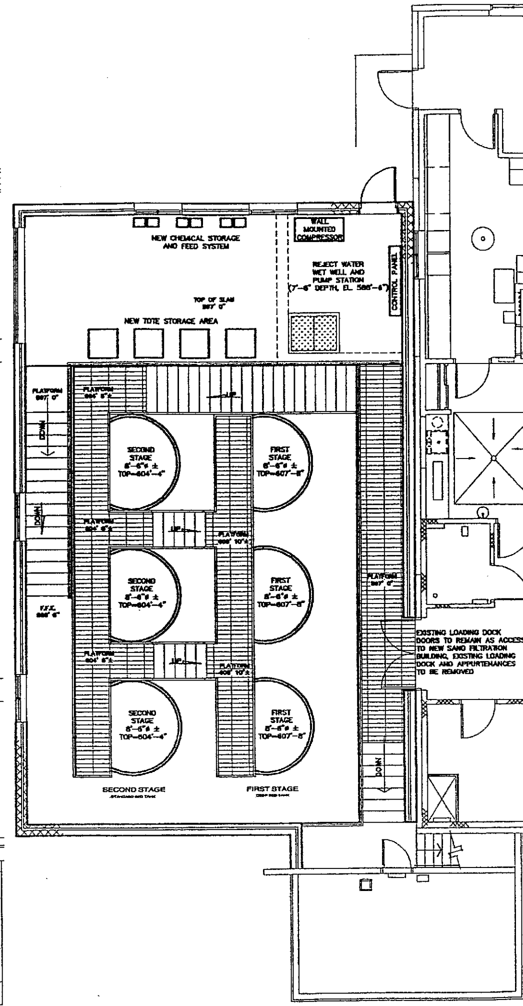

PLAN PLATFORMS IN NEW DUAL SAND FILTER BUILDING (3/4)
SCALE: 1/4"=1'-0"

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WATCHTOWER EDUCATIONAL CENTER
WASTEWATER TREATMENT FACILITY
PROPOSED UPGRADE PLAN
NEW DUAL SAND FILTER
BUILDING PLAN

Project No.	7600006.02
Proj. Manager	P.LEGMA
Proj. Designer	J.McDONALD
Drawn By	D.HARRINGTON
Checked By	J.McDONALD
Scale	AS SHOWN
Approved	J.McDONALD

4

Sheet 4 of 6
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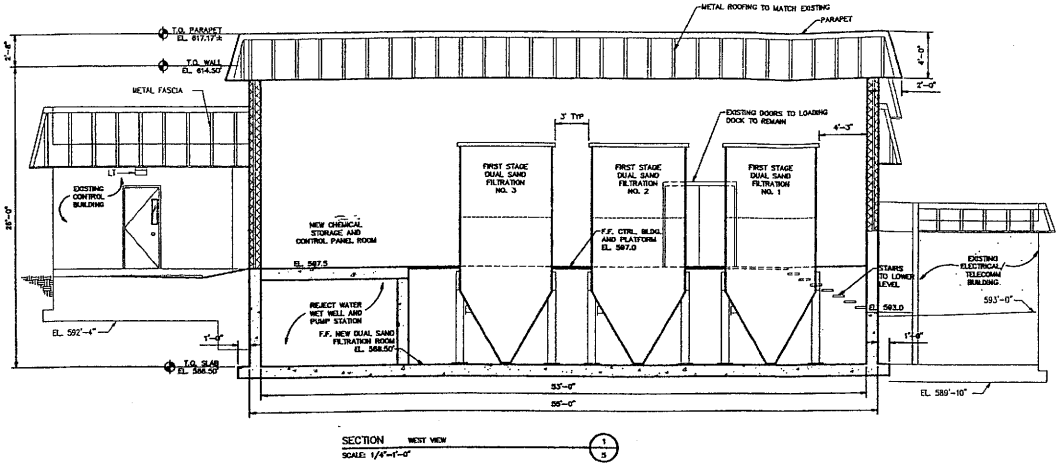

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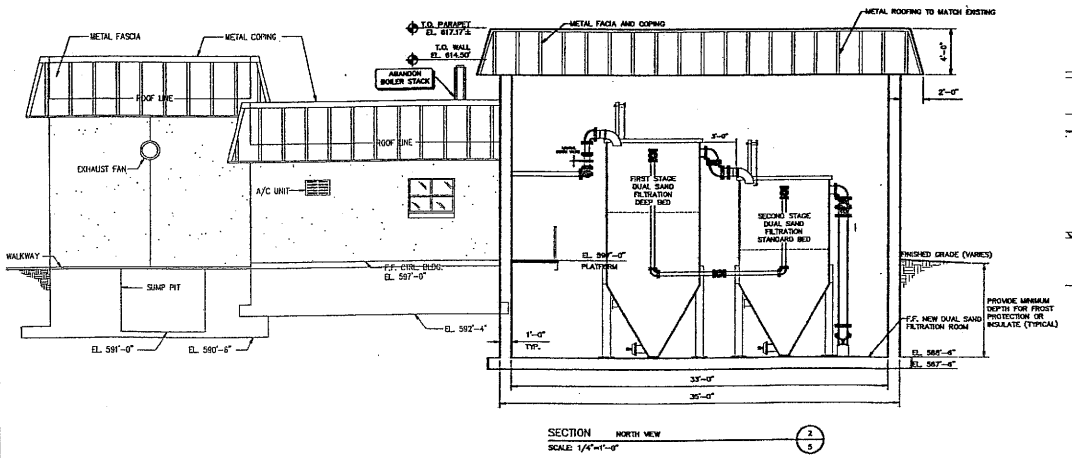

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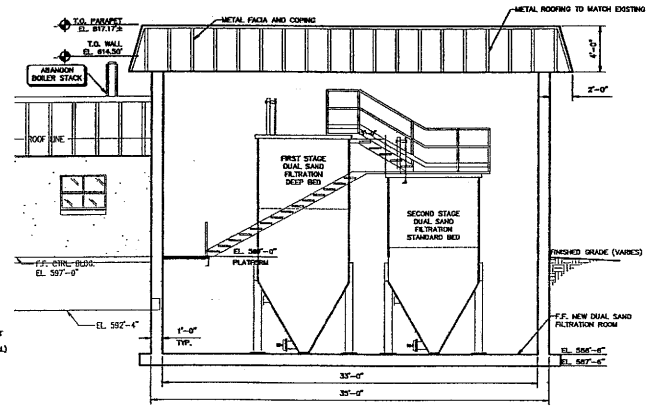

SECTION STAIRS AND PLATFORMS (3/5)
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NOT FOR CONSTRUCTION
AUGUST 15, 2000

WATCHOVER EDUCATIONAL CENTER
WASTEWATER TREATMENT FACILITY
PROPOSED UPGRADE PLAN

NEW DUAL SAND FILTER BUILDING SECTIONS

Project No.	7600006.02
Proj. Manager	P. LEWIS
Proj. Designer	J. MACDONALD
Drawn By	D. HARRINGTON
Checked By	J. MACDONALD

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Sheet 5 of
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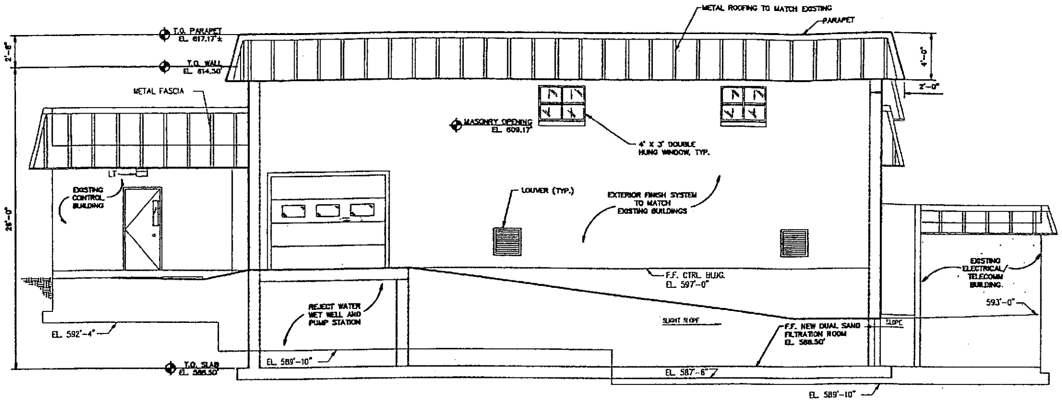

WEST ELEVATION
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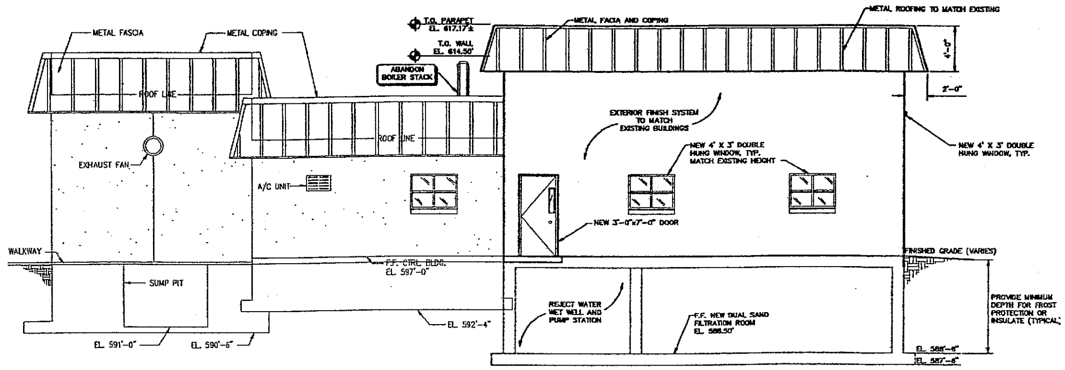

NORTH ELEVATION
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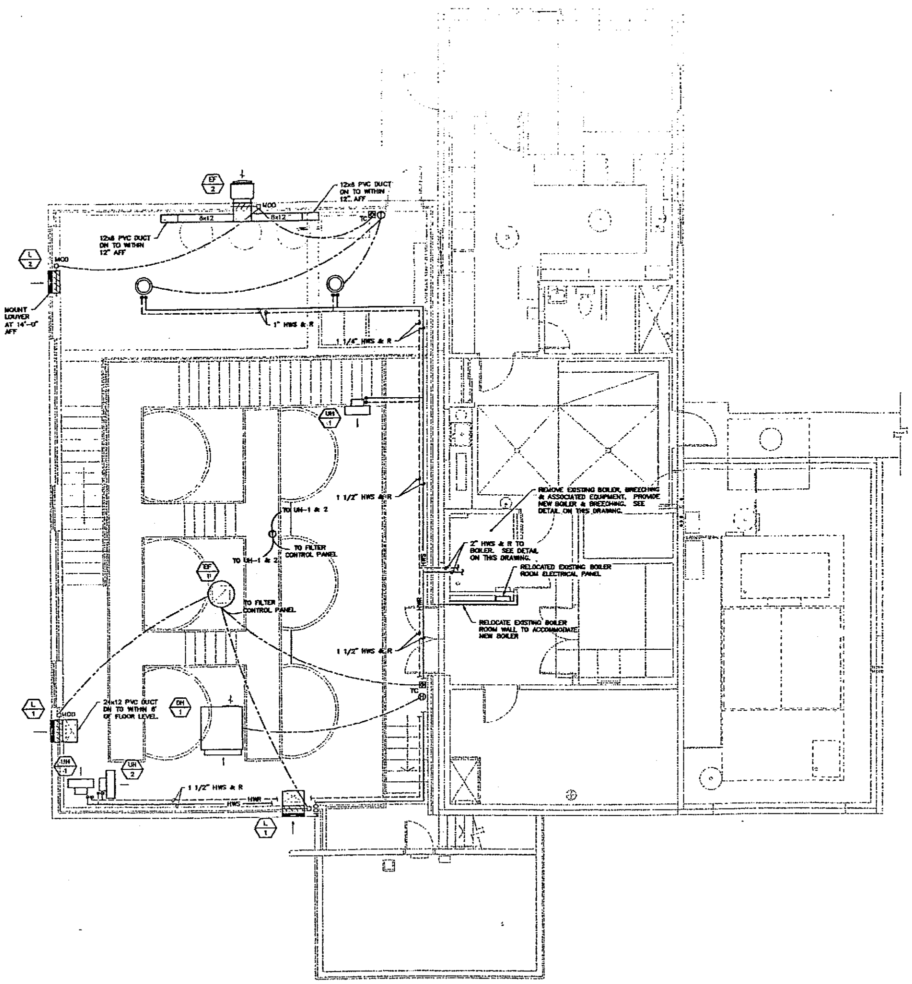
Dufresne-Henry

WATCHTOWER EDUCATIONAL CENTER
WASTEWATER TREATMENT FACILITY
PROPOSED UPGRADE PLAN
NEW DUAL SAND FILTER BUILDING
ELEVATIONS

Project No.	7600006.02
Proj. Manager	P.LEGER
Proj. Designer	J.HADONALD
Drawn By	D.HARRINGTON
Checked By	J.HADONALD
Scale	AS SHOWN
Approved	J.HADONALD

6

Sheet 6 of 8
D 7600006.02



HEATING & VENTILATION PLAN

SCALE: 1/4"=1'-0"

EQUIPMENT

B-1 BOILER – OIL FIRED BOILER, BUDERUS MODEL G315/7 OIL FIRED BOILER WITH A RIELLO MODEL F15 OIL BURNER AND A 2105 LOGAMATIC CONTROL SYSTEM. BOILER SHALL HAVE A IBR NET CAPACITY OF 406 MBH. BOILER SHALL BE FURNISHED WITH AN ASME RELIEF VALVE, TEMPERATURE AND PRESSURE GAUGE, HONEYWELL L4006A1058 ADJUSTABLE AQUASTAT, HONEYWELL MODEL L4006E1109 MANUAL RESET HIGH LIMIT AQUASTAT AND TWO HYDROLEVEL MODEL 560 PROBE TYPE LOW WATER CUTOFFS. ELECTRICAL DATA: 2 HP, 120V/1ø.

DH-1 DEHUMIDIFIER: DESERT AIRE MODEL H/WC 500 WITH A CAPACITY OF 23 LBS OF WATER PER HOUR AT INLET CONDITIONS OF 75F AND 60 % RH. ELECTRICAL DATA: 23.5 AMPS, 208/230V/3ø.

EF-1 EXHAUST FAN: GREENHECK MODEL CUBE -160 WITH A CAPACITY OF 3808/1669 CFM WITH TWO SPEED MOTOR AT 0.25 INCHES WC. FURNISH WITH MOTORIZED LOW LEAKAGE DAMPER AND 12 INCH ROOF CURB. ELECTRICAL DATA: 3/4 HP, 208V/1ø.

L-1 LOUVERS: NCA XAD 4, 24"x36" WITH A MINIMUM FREE AREA OF 3.5 SF, KYNAR FINISH. LOUVER TO BE FURNISHED WITH INSECT SCREEN, AND MOTORIZED LOW LEAKAGE DAMPER.

L-2 LOUVERS: NCA XAD 4, 24"x24" WITH A MINIMUM FREE AREA OF 2.0 SF. FINISH TO BE KYNAR AND LOUVER TO BE FURNISHED WITH INSECT SCREEN, AND MOTORIZED LOW LEAKAGE DAMPER.

P-1 CIRCULATION PUMP – TACO MODEL 1635 WITH A CAPACITY OF 50 GPM AT 23 FT OF HEAD. ELECTRICAL DATA: 3/4 HP, 120V/1ø.

UH-1 UNIT HEATER: MODINE MODEL HS-165L WITH A HEATING CAPACITY OF 112,000 BTU/HR AT 11.0 GPM AT 200F EWT. PROVIDE WITH A TEFC MOTOR AND A NEMA 4X DISCONNECT. ELECTRICAL DATA: 1/3 HP, 120V/1ø.

UH-2 UNIT HEATER: MODINE MODEL HS-121L WITH A HEATING CAPACITY OF 85,000 BTU/HR AT A 8.5 GPM AT 200F EWT. PROVIDE WITH A TEFC MOTOR AND A NEMA 4X DISCONNECT. ELECTRICAL DATA: 1/8 HP, 120V/1ø.

UH-3 UNIT HEATER: MODINE MODEL V-85L VERTICAL UNIT HEATER WITH A HEATING CAPACITY OF 50,000 BTU/HR AT A 5 GPM AT 200F EWT. PROVIDE WITH A TEFC MOTOR AND A NEMA 4X DISCONNECT. ELECTRICAL DATA: 1/15 HP, 120V/1ø.

SEQUENCE OF OPERATION

UNIT HEATERS: UNIT HEATERS WILL START IN RESPONSE TO A CALL FOR HEAT FROM THE HEATING THERMOSTAT. WHEN THE THERMOSTAT CALLS FOR HEAT, THE CIRCULATION PUMPS SHALL START AND THE ZONE VALVES FOR EACH UNIT HEATER SHALL OPEN. WHEN THE AQUASTAT FOR EACH UNIT HEATER REACHES 120 F THE UNIT HEATER FAN SHALL START.

EXHAUST FAN EF-1: THE EXHAUST FAN SHALL BE A TWO SPEED EXHAUST FAN. IT SHALL START ON LOW SPEED UPON A CONTACT CLOSURE FROM THE FILTER CONTROL PANEL (WHEN THE BACKWASH BLOWER IS OPERATING) AND SHALL CONTINUE TO OPERATE FOR 5 MINUTES AFTER THE BLOWER STOPS. THE FAN SHALL ALSO START ON HIGH SPEED WHEN CONTROLLED BY THE WALL MOUNTED TIMER AND SHALL OPERATE UNTIL THE TIMER TIMES OUT.

EXHAUST FAN EF-2: SHALL START FROM THE WALL MOUNTED TIMER AND SHALL OPERATE UNTIL THE TIMER TIMES OUT.

LOUVERS: THE MOTORIZED DAMPERS FOR THE LOUVERS SHALL OPEN WHENEVER THE EXHAUST FAN STARTS AND REMAIN OPEN AS LONG AS THE EXHAUST FAN IS OPERATING.

DEHUMIDIFIER: THE DEHUMIDIFIER SHALL OPERATE BASED ON THE WALL MOUNTED HUMIDISTAT, STARTING AND STOPPING TO MAINTAIN SPACE HUMIDITY.

CIRCULATION PUMP: THE CIRCULATION PUMP SHALL START AND STOP BASED ON A CALL FOR HEAT FROM THE SPACE TEMPERATURE THERMOSTAT. THE PUMP SHALL BE CONNECTED INTO THE EXISTING BOILER HOT WATER SUPPLY.

PIPE AND FITTING SCHEDULE

SERVICE	SIZE	TEST PSI	PIPE TYPE	PIPE SCHEDULE	FITTINGS TYPE	FITTINGS SCHEDULE	REMARKS
HEATING WATER SUPPLY & RETURN	UP TO 2"	200	CUL	STD	CUS	STD	
HEATING WATER SUPPLY & RETURN	2 1/2" & LARGER	200	CUS	STD	CUS	STD	SEE NOTE 2

VALVE SCHEDULE

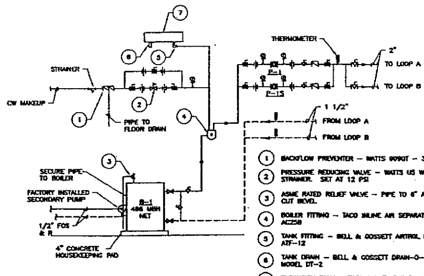
SERVICE	SIZE	TYPE: GATE	GLOBE	CHECK	BALL	PLUG	REMARKS
HEATING WATER SUPPLY & RETURN	UP TO 2"	—	—	CVT	BVT	—	SEE NOTE 1
HEATING WATER SUPPLY & RETURN	2 1/2" & LARGER	—	—	—	—	BTRF	

INSULATION SCHEDULE

SERVICE	SIZE	TYPE	THICKNESS	REMARKS
HEATING WATER SUPPLY & RETURN	ALL	H11	1 1/2"	SEE NOTE 1

NOTES:

1. REFER TO SPECIFICATIONS FOR PIPE, FITTINGS, VALVE AND INSULATION TYPES.
2. HEATING WATER SUPPLY & RETURN PIPING FOR 2 1/2" & LARGER PIPE SIZES AT CONTRACTOR'S OPTION CAN BE TYPE SI, SCHEDULE 40, BLACK STEEL WITH WELDED JOINTS.



1. BACKFLOW PREVENTER – WATTS 009QT – 3/4"
2. PRESSURE REDUCING VALVE – WATTS U5 WITH STRAINER. SET AT 12 PSI
3. ASME RATED RELIEF VALVE – PIPE TO 6" AFF WITH CUT BEVEL.
4. BOILER FITTING – TACO INLINE AIR SEPARATOR MODEL AC258
5. TANK FITTING – BELL & GOSSETT AIRTROL FITTING ATF-12
6. TANK DRAIN – BELL & GOSSETT DRAIN-O- TANK MODEL DT-2
7. EXPANSION TANK – TACO MODEL CAX #4, 12 GALLON ACCEPTANCE VOLUME, 40" LONG x 18" DIA.
8. CIRCULATION PUMPS – TACO MODEL 50

BOILER PIPING SCHEMATIC

NO SCALE

ABBREVIATIONS

ALL ABBREVIATIONS SHOWN MAY NOT APPLY	
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
B	BOILER
BDD	BACKDRAFT DAMPER
CFM	CUBIC FEET PER MINUTE
CUH	CABINET UNIT HEATER
DB	DRY BULB
DH	DEHUMIDIFIER
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EF	EXHAUST FAN
EWT	ENTERING WATER TEMPERATURE
FD	FIRE DAMPER
FPM	FEET PER MINUTE
GPM	GALLONS PER MINUTE
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
L	LOUVER
LAT	LEAVING AIR TEMPERATURE
LF	LINEAR FEET
LWT	LEAVING WATER TEMPERTURE
MBH	THOUSAND BTU/HOUR
MOD	MOTOR OPERATED DAMPER
NTS	NOT TO SCALE
OA	OUTDOOR AIR
PD	PRESSURE DROP
R	RETURN
RA	RETURN AIR
S	SUPPLY
SA	SUPPLY AIR
SCFM	STANDARD CFM
SF	SQUARE FEET
UH	UNIT HEATER
VD	VOLUME DAMPER

HVAC LEGEND

SYMBOLS	
—A—	COMPRESSED AIR
—CD—	CONDENSATE DRAIN
—FOS—	FUEL OIL SUPPLY
—FOR—	FUEL OIL RETURN
—HWS—	HOT WATER SUPPLY
—HWR—	HOT WATER RETURN
—LPG—	LP GAS
	THERMOSTAT
	THERMOSTAT(HEATING)
	THERMOSTAT(COOLING)
	THERMOSTAT(HEATING/COOLING)
	SWITCH W/PILOT
	SWITCH
	SPEED SWITCH
	PRESSURE SWITCH
	WORK TO BE REMOVED
	FLEXIBLE CONNECTION
	PIPE DROP
	BOTTOM CONNECTION/TURN AWAY
	TOP CONNECTION/TURN TOWARDS
	DIRECTION OF FLOW
	PIPE ANCHOR
	UNION (SCREWED)
	REDUCER,CONCENTRIC
	CAP OR PLUG
	NEW TO EXISTING CONNECTION
	GATE VALVE
	BALL VALVE
	GLOBE VALVE
	CHECK VALVE
	BUTTERFLY VALVE
	CONTROL VALVE (2-WAY)
	CONTROL VALVE (3-WAY)
	PRESSURE REDUCING VALVE
	PRESSURE RELIEF VALVE
	TEMPERATURE-PRESSURE RELIEF VALVE
	BALANCING VALVE
	PLUG COCK
	STRAINER
	THERMOMETER
	PRESSURE GAUGE WITH COCK
	AIR VENT
	PUMP
	VOLUME DAMPER
	BACKDRAFT DAMPER
MOD	MOTOR OPERATED DAMPER
	FIRE DAMPER
	SUPPLY/FRESH AIR
	RETURN/EXHAUST AIR
	FLEXIBLE DUCTWORK
	SUPPLY DUCT SECTION
	RETURN DUCT SECTION
	EXHAUST DUCT SECTION
	SUPPLY ROUND DUCT SECTION
	RETURN ROUND DUCT SECTION
	EXHAUST ROUND DUCT SECTION
	SUPPLY DIFFUSER
	RETURN REGISTER OR GRILLE
	EXHAUST REGISTER OR GRILLE
DTY / #	EQUIPMENT TYPE / EQUIPMENT NUMBER
TYPE / CFM	REGISTER, DIFFUSER OR GRILLE DESIGNATION / CFM

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Dufresne-Henry
Pawling, New York
Tel. (914) 855-1255 • FAX (914) 855-1780
www.dufresne-henry.com

Rev.	Description	By	Date

WATCHTOWER EDUCATIONAL CENTER
WASTEWATER TREATMENT FACILITY
PROPOSED UPGRADE PLAN

NEW DUAL SAND FILTER BUILDING
HEATING & VENTILATION PLAN

PATTERSON NEW YORK

Project No.	7600006.02
Proj. Manager	P.LEGER
Proj. Designer	
Drawn By	
Checked By	
Scale	AS SHOWN
Approved	
Date	

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Sheet 5 of 8
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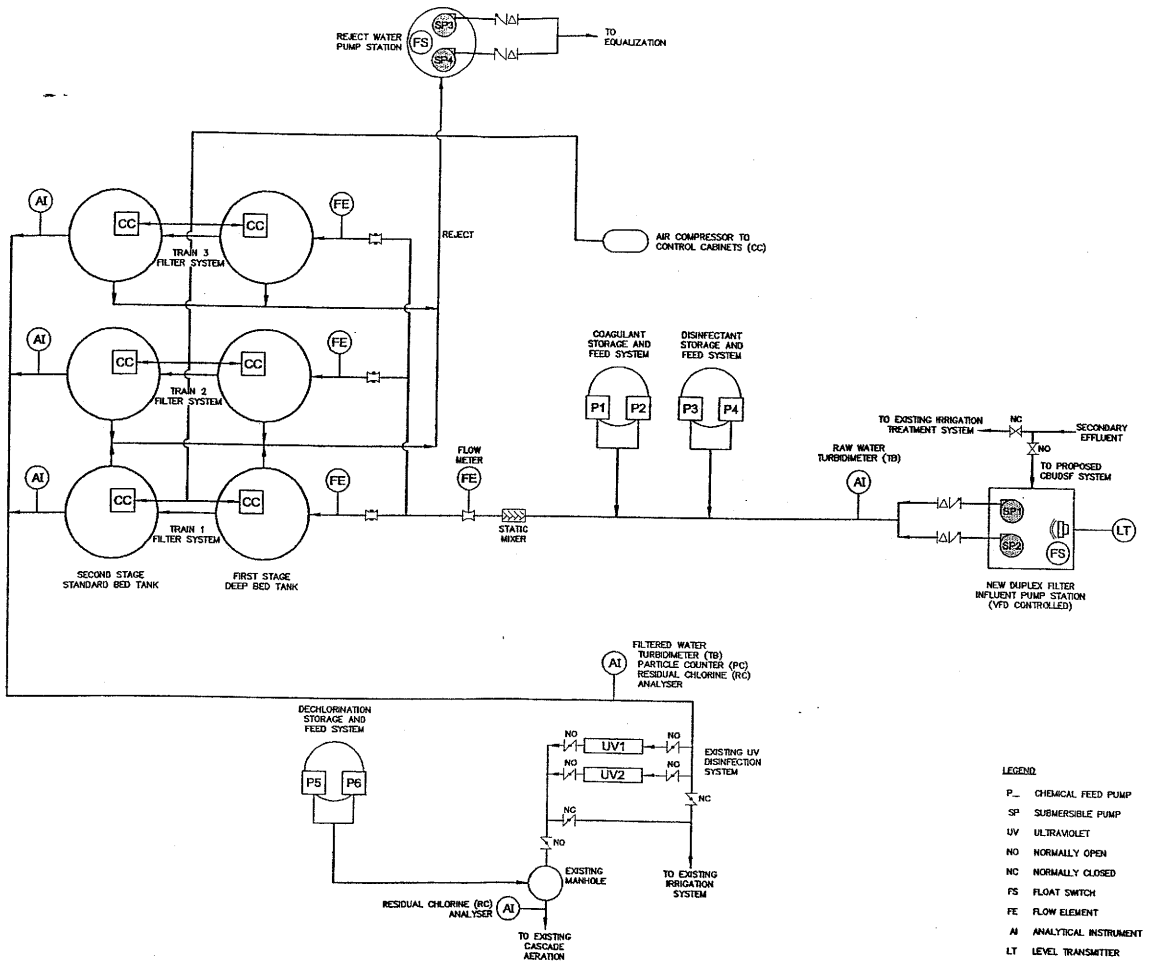

LEGEND

P_	CHEMICAL FEED PUMP		BUTTERFLY VALVE
SP	SUBMERSIBLE PUMP		CHECK VALVE
UV	ULTRAVIOLET		PLUG VALVE
NO	NORMALLY OPEN		GATE VALVE
NC	NORMALLY CLOSED		PINCH VALVE
FS	FLOAT SWITCH		FLOW METER
FE	FLOW ELEMENT		COMPRESSOR
AI	ANALYTICAL INSTRUMENT	P	PUMP
LT	LEVEL TRANSMITTER		SONIC LEVEL SENSOR
CC	CONTROL CABINET		

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WATCHTOWER EDUCATIONAL CENTER
WASTEWATER TREATMENT FACILITY
PROPOSED UPGRADE PLAN

PROCESS AND INSTRUMENTATION DIAGRAMS

8

Section 5

SECTION FIVE

OUTLINE SPECIFICATIONS

5.1 OUTLINE SPECIFICATIONS

The construction Contract Documents and technical specifications will conform to the Construction Specifications Institute (CSI) standard format. Technical specification sections which will be utilized in the final design of the Watchtower WWTP upgrade are outlined in Appendix D.

Specifications contain the qualitative requirements for materials and workmanship for this project. The specifications define these requirements in order to assure the correct materials and methods of assembly or installation. The CSI format provides a standard 16 division framework for organizing construction specifications for this project. Sub-groups of specifications have been identified for inclusion in each division. Each individual specification is further divided into three parts. Part 1 provides general information describing the item of work, work included, submittal requirements, quality assurance and relevant standards. Part 2 describes the products to be provided. How the work is to be executed is described in Part 3. The specifications also include the Bidding and Contract requirements as well as General Requirements of The Contract.

Section 6

SECTION SIX

PRELIMINARY COST ESTIMATE

6.1 OPINION OF PROBABLE CONSTRUCTION COST

Conceptual cost estimates have been revised and updated to reflect selected upgrade technology and the preliminary plans and details submitted with this Facility Plan. Allowances have been provided for items of work not fully developed. These areas include electrical and instrumentation systems. Items covered under Sitework include clearing and demolition, landscaping, paving and drainage work. A 20% contingency has been carried for the preliminary stage of the design. A basis for the line items costs follows the table.

TABLE 6.1
ESTIMATED CONSTRUCTION COSTS

WATCHTOWER WWTP FACILITY UPGRADE			
ITEM	QUANTITY	UNIT COST	ITEM COST
EXCAVATION.	1000 Cu. Yds.	$25/Cu.Yd.	$30,000
DualSand™ FILTRATION	Lump Sum	$1,005,000	$1,005,000
BLDGS./FOUND.	1925 sq ft	$90/Sq. Ft.	$174,000
MECHANICAL/HVAC	Lump Sum	$75,000	$75,000
INFLUENT PUMPING STATION	1	$100,000	$100,000
INSTRUMENTATION	Lump Sum	$50,000	$50,000
REJECT WATER PUMP STATION	Lump Sum	$25,000	$25,000
ELECTRICAL WORK	Lump Sum	$60,000	$60,000
PIPING/VALVING	Lump Sum	$40,000	$40,000
SITE WORK	Lump Sum	$150,000	$150,000
GENERAL CONDITIONS	15%	$256,300	$256,300
CONTINGENCY	20%	$393,100	$393,100
	REGULATORY PROGRAM		$2,358,400
	SPDES PROGRAM		$0
	ENGINEERING FEES		$388,696
	LEGAL AND FORCE ACCOUNT FEES[1]		$23,546
	TOTAL		$2,773,000

[1]Estimated at 1%± of Regulatory Program Construction cost.

Excavation - Excavation costs are estimated on a cost per cubic yard basis for the principle building foundation preparation. Trench work and site work are figured separately. The cost figure includes excavation, stockpile, backfill and removal of spoil, and compaction of the subgrade in preparation of the foundation.

DualSand™ Filtration - This item represents the full scope of supply provided by Siewert Equipment Co., Inc. This proposal of August 14, 2000 is provided in Appendix E of this report.

Bldgs./Found. - Costs are calculated for this item on a square footage basis. The cost figure includes all concrete work, structural and architectural design elements, including stairs, railings, lighting and windows. Electrical power supply and Mechanical systems are estimated separately.

Mechanical/HVAC - Mechanical heating and ventilation systems were calculated separately from building costs. The existing boiler in the control building will be replaced with a larger capacity boiler to serve the new building requirements along with the existing. The existing boiler room will also be enlarged slightly to accommodate the new boiler.

Pumping Station - A new filter influent pump station will be located in the existing filter room.

Instrumentation - Instrumentation devices in addition to the units provided in the DualSand™ Proposal are required to demonstrate compliance in accordance with Technical Bulletin No. 3. Costs include the necessary interconnection to the existing plant SCADA system.

Reject Pump Station - A duplex package pump station is proposed to be incorporated into the new structure foundation. Costs were calculated separately for the pumping and structural requirements for this pump station.

Electrical Work - An allowance was used to calculate estimated electrical power supply costs, based on 10% of the equipment costs. This item included serving the new filtration system power feed from the existing motor control center.

Piping/valving - Process piping was calculated on an installed cost of $100 per linear foot, to include all valves, hangers and supports.

Site Work - This item includes all paving, curbs, walks, site drainage and erosion control.

Overhead and Profit - An allowance of 15% was provided for contractor's general conditions, overhead and profit, including construction bonding and insurance requirements.

Contingency 20% - At the Facility Planning stage of preliminary design, we recommend maintaining a 20% contingency.

6.2 OPINION OF OPERATIONS AND MAINTENANCE COSTS

Table 6.2 presents the projected opinion of operations and maintenance costs for the preferred upgrade technology of a continuous backwashed upflow DualSand™ Filtration system. The Year 1 O&M costs have been based on the Owner's actual 1999 operation and maintenance costs incurred at the WWTP and have been increased by an inflation factor of 3% per year for two years. Back-up information for the projected Year 1 O&M cost increment values for each line item presented has been provided following the table.

TABLE 6.2
ESTIMATED O & M COSTS

WATCHTOWER WWTP FACILITY UPGRADE		
COST ITEM	YEAR 1 O&M COSTS[1]	YEAR 1 UPGRADE PROGRAM O&M COST INCREMENT
VOLUNTEER PERSONNEL[2]	$47,740	$8,220[3]
ELECTRICAL	$42,107	$1,000
BUILDING/GROUNDS	$15,870	$200
FUEL	$7,325	$2,733
CHEMICALS	$40,696	$4,528
SERVICE CONTRACTS	$10,396	$4,500
EQUIPMENT	$3,316	$1,323
LAB TESTING	$13,589	$0
TOTAL	**$181,039**	**$22,504**
FIRST YEAR O&M COSTS		**$203,543**
PRESENT WORTH (I=6% , n=20 years)		**$258,000**

[1] Watchtower actual O & M costs for 1999 increased by an inflation factor of 3% for two years.

[2] Volunteer personnel costs are developed based on an average volunteer labor cost of $10/hr. plus an overhead factor of 0.40.

[3] Based on two-hours/day of normal applied labor - not Watchtower factored labor.

Personnel - It is projected that two hours per day additional labor will be required for the preferred alternative upgrade. Labor will consist of additional time spent performing visual monitoring of the filter, chemical feed systems and readouts from the online analyzers, plus visual monitoring of filter feed and reject water pump stations, as well as increased maintenance of equipment and additional janitorial work.

Electrical - Electrical costs were calculated by the DualSand™ vendor based on projected operating time of supplied equipment, plus a projected cost for the online analyzers and flow meter supplied.

Building/Grounds - The preferred alternative adds an additional grounds and buildings requirement. Costs include light replacement and building maintenance such as painting.

Fuel - The preferred alternative increases the current square footage requiring heat to increase by ten percent, thus costs were determined by ten percent of current fuel costs.

Chemicals/Supplies - Watchtower currently supplies chemicals for phosphorus removal and anticipates continued use of the chemicals to meet the phosphorus limits. Additional chemical costs include sodium hypochlorite for disinfection, sodium bisulfite for dechlorination and an aluminum based primary flocculent for enhanced phosphorus removal. The primary flocculent cost has been set at 50% of vendor supplied figure due to continued use of existing phosphorus removal chemicals.

Service Contracts - The majority of this line item is for solids disposal, and the projected increment increase is for service contracts to clean, calibrate and maintain the on-line analyzer required by the NYC watershed upgrade program. It is anticipated that the analyzers will be serviced twice a year and the cost will include any required reagents. The flow meters are projected to be serviced/calibrated once a year.

Equipment - The projected costs for equipment maintenance are based on the DualSand™ vendor supplied projections contained in Appendix E.

Lab Testing - There is no requirement for additional testing other than chlorine residuals, which will be done with an on-line analyzer. All permit requirements will be met by the data provided by the on-line turbidimeter and chlorine analyzers as specified in Note 1 on page 6 of 8 of SPDES permit # NY - 0165778. Therefore, no costs were assigned to this line item.

Section 7

SECTION SEVEN

CONSTRUCTION SCHEDULE

7.1 CONSTRUCTION SCHEDULE

Active construction is slated to begin on or before July, 2001 and be functionally complete on or before April, 2002. Other related design, construction administration and operation performance phase activities and their milestone dates are shown in Table 7.1 below.

TABLE 7.1
ESTIMATED COMPLETION SCHEDULE

MILESTONE	ACTIVITY DESCRIPTION	ESTIMATE COMPLETION		
		Subsurface Disposal	Consolidation	Upgrade
M5	**Submit Approvable Facility Plan**	-	-	**9/15/00**
	Regulatory Approval Confirmation			10/1/00
M6	**Submit Approvable PUP**	-	-	**2/1/01**
	Regulatory Approval Confirmation			2/15/01
M7	**Submit Approvable FUP**	-	-	**3/15/01**
	Regulatory Approval Confirmation			4/2/01
M8	**Submit WWTP OWNER/Contractor Agreements**	-	-	**6/1/01**
	Regulatory Approval Confirmation			6/15/01
	Contractor Notice to Proceed			7/2/01
M9	**Submit Functional Completion Certification**	-	-	**4/1/02**

MILESTONE	ACTIVITY DESCRIPTION	ESTIMATE COMPLETION		
		Subsurface Disposal	Consolidation	Upgrade
	Regulatory Approval Confirmation			4/15/02
M10	**Submit Construction Close-out Documents**	-	-	**5/17/02**
	Update Record Drawings			6/7/02
	Complete Operational Phase			5/16/03

The complete project schedule contained in **Appendix F** identifies the key milestones and phasing issues for the Watchtower WWTP upgrade including the construction effort schedule.

Appendix

Appendix A

CUP Approval Letters

Response to NYCDEP's CUP Review Comments

New York State Environmental Facilities Corporation
(800) 882-9721 *Within NY State* (518) 457-4100
FAX: (518) 485-8773 www.nysefc.org

NEW YORK STATE 30 YEARS ENVIRONMENTAL FACILITIES CORPORATION

June 7, 2000

Mr. Kent E. Fischer
Watchtower Bible & Tract Society of NY, Inc.
100 Watchtower Drive
Patterson, NY 12563

Re: NYC Watershed - WWTP Upgrade Program
Watchtower Educational Center
Conceptual Upgrade Plan Approval

Dear Mr. Fischer:

EFC is pleased to inform you that the Conceptual Upgrade Plan you submitted with regard to the above-referenced project has been approved by NYCDEP. A copy of the NYCDEP approval letter has been enclosed for your reference. Please note any comments included by NYCDEP in their approval letter regarding issues that require additional discussion in the Facility Plan.

In accordance with the Upgrade Contract, this letter authorizes the preparation of the Facility Plan for this project. Please inform your Engineer to proceed with preparation of the Facility Plan. The requirements of the Facility Plan are included within the Scope of Engineering Services portion of your Upgrade Contract.

Should you have any questions regarding this letter, please feel free to contact an EFC representative at (800) 882-9721 or (518)457-4138.

Sincerely,

Robert H. Sammons, P.E.
Program Manager

cc: T. Figlinski
R. Gainer
Robert Ravallo, NYCDEP

The City of New York
Department of Environmental Protection

Joel A. Miele Sr., P.E.
Commissioner

Bureau of Water Supply

William N. Stasiuk, P.E., Ph.D.
Deputy Commissioner

Robert Ravello
Program Manager
WWTP Upgrade Program

465 Columbus Avenue
Valhalla, NY 10595-1336

Tel (914) 742-2004
Fax (914) 773-4407

June 7, 2000

Robert H. Sammons, P.E.
New York State Environmental Facilities Corporation
50 Wolf Road
Albany, NY 12205

Re: Watchtower Educational Center CUP
NYC's WWTP Regulatory Upgrade Program

Dear Mr. Sammons:

This letter constitutes notice that NYCDEP has reviewed and accepted the Conceptual Upgrade Plan ("CUP") prepared by Dufresne-Henry Consulting Engineers, P.C., and dated May, 2000 (received by NYCDEP on May 19, 2000) with regard to the above referenced facility, in accordance with the provisions of Subtask 2.1(F) of the Owner's Scope of Work attached to the Upgrade Contract between the Watchtower Educational Center and EFC.

NYCDEP's acceptance constitutes authorization for the WWTP Owner to proceed with preparation of the facility plan portion of the Proposed Upgrade Plan (PUP) for the recommended project approach in accordance with Subtask 2.2 of the Owner's Scope of Work. NYCDEP's authorization is not intended to signify agreement to, approval of, or concurrence with any of the opinions of costs or any specific design set forth in said CUP. NYCDEP expressly reserves its right to review and accept or reject, among other things, proposed costs and design elements during the PUP development. Further, the WWTP Owner's consultant engineer is responsible for ensuring compliance with all applicable laws and regulations and NYCDEP's acceptance of the CUP does not constitute assurance that the engineer's approach will result in compliance with all applicable laws and regulations.

By this letter you are authorized to advise the WWTP Owner in writing to proceed with preparation of the facility plan portion of the PUP. The following issues should be addressed in the Facility Upgrade Plan:

1. On page 2-4, the engineer states that due to wastewater flow equalization, the peak hourly flow is the peak daily flow. This requires further justification and investigation.

www.ci.nyc.ny.us/dep
(718) DEP-HELP

2. On page 2-5, there is statement that existing back up generator is sized to power the entire upgraded facility. Support calculations are required.

3. On page 2-5, the paragraph "Sand Filter Sizing" does not address the capacity of the existing sand filters.

4. Back up information is required for the opinion of the probable construction costs.

5. No information is submitted on existing O&M cost

6. For the upgraded facility, the estimated incremental O&M costs for one year includes $45,000 for personnel. It is DEP's understanding that the Watchtower WWTP operators and maintenance personnel are not employees/contractors who are paid directly for their services. Clarification is required as to how these personnel will be paid.

7. Engineering, legal and force account fees are not included in the report. Total present worth costs should be provided for the facility upgrade project.

8. The proposed upgrade project specifies a new rapid sand filter system. Based on the submitted WWTP operations summary for 1998 and 1999, the existing rapid sand filters perform adequately it appears that the existing filters already comply with the Watershed Regulation's requirements.

9. Provide supporting information for the proposed new building area of 3,700 sf. To accommodate the facility upgrade, amount of site work ($156,500), and electrical work ($85,000).

Should you have any questions, please do not hesitate to contact me. I can be reached at (914) 742-2004.

Sincerely yours,

Robert Ravallo

cc: Sandra Jackson, Esq., NYCDEP Legal
Edwin Polese, NYCDEP
Joseph Maggio, NYCDEP

Dufresne-Henry

145 Route 22, Suite 201 . P.O. Box 417 . Pawling, NY 12564 . Tel: 845.855.1255 . Fax: 845.855.1780 . E-mail: gwpc1@aol.com

August 30, 2000

Mr. Robert Ravallo
Program Manager
WWTP Upgrade Program
465 Columbus Avenue
Valhalia, New York 10595-1336

Re: Watchtower Education Center CUP/PUP
NYCDEP WWTP Regulatory Upgrade Program
Responses to Review Comments

Dear Mr. Ravallo:

In reference to your review comments as contained in the June 7, 2000 review and approval of the above referenced project CUP, we offer the following responses and/or answers as contained in the draft PUP Facilities Plan Report. Responses to review comments are also referenced to the appropriate section and page in the report. Responses to Comments 1 through 9 follow the repeated comment as follows:

1. *On page 2-4, the engineer states that due to wastewater flow equalization, the peak hourly flow is the peak daily flow. This requires further justification and investigation.*

Response: We have investigated that statement and found it to be incorrect. The reference to peak hourly flow on Page 2-4 should have read peak daily flow, which is 330,000 gpd. This relates to a peaking factor of 2.0 times the design average daily flow of 165,000 gpd. The size of the existing equalization basin(s) provide capacity for peak daily flow, as well as maximum recorded hourly flow (peak hourly). No changes in the hydraulic loading design are anticipated in the WWTP regulatory upgrade.

2. *On page 2-5, there is a statement that existing back-up generator is sized to power the entire upgraded facility. Support calculations are required.*

Response: The existing stand-by generator is a 275 kW unit and the existing motor control center is sized to provide electrical feed for the upgrade electrical load. Historical power usage recordings for the WWTP in the last two years indicate a peak process power load of 143 kW. The projected power load for the recommended dual sand filter building, including the new filter influent pump station and back wash eject water pump station is 48 kW.

Combining the existing peak recorded power load with the projected upgrade component power load, the expected stand-by power capacity needed will be 191 kW - 70 percent of the existing stand-by generator output, therefore we conclude that the existing generator is adequate.

Comment 3: *On page 2-5, the paragraph, "Sand Filter Sizing" does not address the capacity of the existing sand filters.*

Response: This is now not applicable, since the discovery that the existing single media filters do not meet the NYCDEP design standard (Table 9) for required media depth. Therefore, the existing filters are not being considered for use in the proposed upgrade plan and are scheduled for removal. ***See text discussion on page 3-3 of PUP Facility Plan Report.***

Comment 4: *Back-up information is required for the opinion of the probable construction costs.*

Response: Back-up information was lacking to explain the basis for each line item cost in the probable construction cost table of the CUP. Back-up information is included with the estimated construction costs (Table 6.1) of the PUP Facility Plan Report. ***See text explanation of line item probable construction costs, contingency, engineering fees, legal and force account fees on Pages 6-2 and 6-3 of the Facility's Plan Report.***

Comment 5: *No information is submitted on existing O&M cost.*

Response: WWTP owner supplied existing O&M costs were furnished after the CUP was submitted. These costs have been pro-rated and are included in Section 6.2 of the PUP under "Opinion of Operations and Maintenance Costs." ***See text discussion of O&M cost incremental values on Page 6-3 and 6-4 of the PUP Facility Plan Report.***

Comment 6: *For the upgraded facility, the estimated incremental O&M costs for one year includes $45,000 for personnel. It is DEP's understanding that the Watchtower WWTP operators and maintenance personnel are not employees/contractors who are paid directly for their services. Clarification is required as to how these personnel will be paid.*

Response: The personnel cost of $45,000 shown in the CUP was listed in the wrong column. It was the owner's one-year existing O&M cost, not the incremental cost. While the comment is true, in that all WWTP O&M personnel are volunteers with no

paid hourly status, labor costs were (as allowed by the EFC/Watchtower Contract) established by the following method:

Personnel labor costs are developed based on an average direct volunteer cost of $10/hour, plus an overhead factor of 0.40. The direct cost is based on the WWTP owner's cost of providing food, lodging, health care, general maintenance reimbursements and travel reimbursements to its volunteers. ***This information is included as a footnote on Table 6. 2 Page 6 - 2 of the Facility Plan Report.***

Comment 7: *Engineering, legal and force account fees are not included in the report. Total present worth costs should be provided for the facility upgrade project.*

Response: Engineering, legal and force account fees are included in the PUP Facility Plan Report under Section 6.1. Estimated total project costs and present worth on O&M cost increments are also provided for in Section 6.1. ***See Tables 6.1 and 6.2 of the Facility Plan Report.***

Comment 8: *The proposed upgrade project specifies a new rapid sand filter system. Based on the submitted WWTP operations summary for 1998 and 1999, the existing rapid sand filters perform adequately it appears that the existing filters already comply with the Watershed Regulation's requirements.*

Response: See Comment 3 response.

Comment 9: *Provide supporting information for the proposed new building area of 3,700 square feet. To accommodate the facility upgrade, amount of site work ($156,500), and electrical work ($85,000).*

Response: Since the CUP was submitted, project scope activities on the PUP including a design workshop, facilities tours and the evaluation of alternative process filtration technology have been performed. This resulted in the selection of a recommended filtration technology that required a revised location and smaller

building area than 3,700 square feet as contained in the CUP. ***See Figure 3.4 of the PUP Facility Plan Report for the revised building area.*** Costs **for site work and electrical work are also revised downward and are shown in the cost section of the PUP Facility Plan Report.** ***See Table 6.1, Page 6 - 1 of the PUP Facility Plan Report.***

Please review these comment responses as a part of the Draft PUP Facility Plan review and advise as to whether these responses are adequately addressed in this letter, the PUP Facility Plan or both.

This letter is not being sent separately, but is being included in Appendix A of the PUP Facility Plan.

Should you have any questions, please do not hesitate to contact me or Phil Leger at (914)562-3430 or Norton True, Project Technical Advisor at (800) 786-2261.

Very truly yours,

DUFRESNE-HENRY, P.C.

Ronald J. Gainer, P.E.
Vice-President

RJG/djr
cc: Philip Leger, P.E. - Project Manager
Norton True - Project Advisor
Jeff McDonald - Design Manager
N:\Watchtower-Wallkill\0824930.d00.wpd

Appendix B

SPDES Permit

91-20-2 (1/89)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

State Pollutant Discharge Elimination System (SPDES)

DISCHARGE PERMIT

Special Conditions (Part I)

Industrial Code: 8999
Discharge Class (CL): 02
Toxic Class (TX): N
Major Drainage Basin: 13
Sub Drainage Basin: 02
Water Index Number: H-31-P44-24-23
Compact Area: Croton

SPDES Number: NY - 0165778
DEC Number: 3-3724- 00027/00002
Effective Date (EDP): 09/01/99
Expiration Date (ExDP): 09/01/04
Modification Date(s):
Attachment(s): General Conditions (Part II) Date: 11/90

This SPDES permit is issued in compliance with Title 8 of Article 17 of the Environmental Conservation Law of New York State and in compliance with the Clean Water Act as amended, (33 U.S.C. Section 1251 et. seq.)(hereafter referred to as "the Act").

PERMITTEE NAME AND ADDRESS

Attention: Kent E. Fischer, General Mgr.

Name: Watchtower Bible & Tract Society of New York, Inc.
Street: 100 Watchtower Drive
City: Patterson State: NY Zip Code: 12563-9204

is authorized to discharge from the facility described below:

FACILITY NAME AND ADDRESS

Name: Watchtower Educational Center & Hotel
Location (C,T,V): Patterson (T) County: Putnam
Facility Address: 100 Watchtower Drive - Attention: Timothy Figlinski, Reg. Mgr.
City: Patterson State: NY Zip Code: 12563-9204
NYTM - E: . NYTM - N: 4 .
From Outfall No.: 001 at Latitude: 41° 29′ 50″ & Longitude: 73° 34′ 50″
into receiving waters known as: Mountain Brook Class: D

and; (list other Outfalls, Receiving Waters & Water Classifications)

(Proposed reclass to C)
NYSDEC has determined that this facility discharges to an intermittent stream as defined in the NYC WR&R.

in accordance with the effluent limitations, monitoring requirements and other conditions set forth in Special Conditions (Part I) and General Conditions (Part II) of this permit.

DISCHARGE MONITORING REPORT (DMR) MAILING ADDRESS

Mailing Name: Watchtower Educational Center & Hotel
Street: 100 Watchtower Drive
City: Patterson State: NY Zip Code: 12563-9204
Responsible Official or Agent: Timothy Figlinski, Reg. Mgr. Phone: (914)878-7000

This permit and the authorization to discharge shall expire on midnight of the expiration date shown and the permittee shall not discharge after the expiration date unless this permit has been renewed, or extended pursuant to law. To be authorized to discharge beyond the expiration date, the permittee shall apply for a permit renewal no less than 180 days prior to the expiration date shown above.

DISTRIBUTION:
J. Marcogliese/E. Zicca
R. Hannaford/E. Reilly
USEPA, Region II
NYCDEP (Valhalla)
Putnam Co. Health Dept.

Permit Administrator: Alexander F. Cieslak, Jr. ~~William E. Steidle~~ NYSDEC
Address: 21 South Putt Corners Rd.
New Paltz, NY 12561-1696
Signature: Alexander F. Cieslak, Jr. Date: 8/5/99

Issued 8/5/98

DISCHARGE NOTIFICATION REQUIREMENTS

a) Within ninety days after the effective date of this permit modification, the permittee shall install and maintain identification signs at all outfalls to surface waters listed in this permit. The sign(s) shall be conspicuous, legible and in as close proximity to the point of discharge as is reasonably possible while ensuring the maximum visibility from the surface water and shore. The signs shall be installed in such a manner to pose minimal hazard to navigation, bathing or other water related activities. If the public has access to the water from the land in the vicinity of the outfall, an identical sign shall be posted to be visible from the direction approaching the surface water.

The signs shall have **minimum** dimensions of eighteen inches by twenty four inches (18" x 24") and shall have white letters on a green background and contain the following information:

N.Y.S. PERMITTED DISCHARGE POINT

SPDES PERMIT No.: NY_____

OUTFALL No. :____

For information about this permitted discharge contact:

Permittee Name: _____

Permittee Contact: _____

Permittee Phone: ( ) - ### - ####

OR:

NYSDEC Division of Water Regional Office Address :

NYSDEC Division of Water Regional Phone: ( ) - ### -####

b) If upon the effective date of this modification, the permittee has installed signs that include the information required by § 17-0815-a(2)(a), but do not meet the specifications listed above, the permittee may continue to use the existing signs for a period of up to five years, after which the signs shall comply with the specifications listed above.

c) The permittee shall periodically inspect the outfall identification signs in order to insure that they are maintained, are still visible and contain information that is current and factually correct.

d) Within ninety days after the effective date of this permit modification, the permittee shall provide for public review at a repository accessible to the public, copies of the Discharge Monitoring Reports (DMRs) as required by the RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS page of this permit. This repository shall be open to the public at a minimum of normal daytime business hours. The repository may be at the business office repository of the permittee or at an off-premises location of its choice (such location shall be the village, town, city or county clerk's office, the local library or other location as approved by the Department). In accordance with the RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS page of your permit, each DMR shall be maintained on record for a period of three years.

91-20-2b (1/89)

SPDES No.: NY 0165778
Part 1, Page 3 of 8

INTERIM EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

Modified 1/18/2000

During the period beginning 09/01/1999 the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

LIMITATIONS APPLY: [X] All Year [ ] Seasonal from _____ to _____
Outfall Number 001

EFFLUENT LIMITATIONS

[X] Flow	30 day arithmetic mean	0.165	[X] MGD [ ] GPD	
[X] CBOD, 5 - Day	Daily Maximum	5.0	mg/l and 6.9	lbs/day(1)
[ ] BOD, 5 - Day	7 day arithmetic mean		mg/l and	lbs/day
[ ] UOD(2)			mg/l and	lbs/day
[X] Solids, Suspended	Daily Maximum	10	mg/l and 13.8	lbs/day(1)
[ ] Solids, Suspended	7 day arithmetic mean		mg/l and	lbs/day
[X] Effluent disinfection required: [X] All Year [ ] Seasonal from _____ to _____				
[X] Coliform, Fecal	30 day geometric mean shall not exceed 200/100 ml			
[X] Coliform, Fecal	7 day geometric mean shall not exceed 400/100 ml			
[X] Chlorine, Total Residual	Daily Maximum		0.1	mg/l
[X] pH	Range		6.0 to 9.0	SU
[X] Solids, Settleable	Daily Maximum		0.1	ml/l
[X] Ammonia	Daily Maximum		2.0 mg/l as NH_3	
[X] Dissolved Oxygen	Daily Minimum		Greater than 7.0 mg/l	
[X] Phosphorus	Daily Maximum		1.0 mg/l as P	
[X] Chlorine Total Residual	Minimum		0.5 mg/l	
[ ] in Contact Chamber				
[ ]				

MONITORING REQUIREMENTS

Parameter	Frequency	Sample Type	Sample Location Influent	Sample Location Effluent
[X] Flow, [X] MGD [ ] GPD	Continuous		X	
[X] CBOD, 5 - Day, mg/l	1/month	6 hr. Comp.	X	X
[X] Solids, Suspended, mg/l	1/month	6 hr. Comp.	X	X
[X] Coliform, Fecal, No./100 ml(3)	1/month	Grab		X
[ ] Nitrogen, TKN (as N), mg/l				
[X] Ammonia (as NH_3), mg/l	1/month	6 hr. Comp.		
[X] pH, SU (standard units)	Daily	Grab	X	X
[X] Solids, Settleable, ml/l	Daily	Grab	X	X
[X] Chlorine, Total Residual, mg/l(3)	Daily	Grab		X(4)
[X] Phosphorus, Total (as P), mg/l	1/month	6 hr. Comp.		X
[X] Temperature, Deg. F	Daily	Grab	X	X
[X] Dissolved Oxygen, mg/l	Daily	Grab	X	X
[ ]				
[ ]				

NOTES: (1) and effluent value shall not exceed ___ % and ___ % of influent values for BOD_5 & TSS respectively.
(2) Ultimate Oxygen Demand shall be computed as follows:
UOD = 1 ½ x $CBOD_5$ + 4 ½ x TKN (Total Kjeldahl Nitrogen)
(3) Monitoring of these parameters is only required during the period when disinfection is required. The operator/permittee shall physically inspect the disinfection equipment daily to insure it is operating properly and must maintain a written log of the inspections.
(4) Sample contact chamber effluent and final effluent limits are specified for both.

Issued 8/5/99

FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning six months from the date of NYCDEP certification of "functional completion" of the facility's upgrade as required in the facility's Final Upgrade Plan the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

LIMITATIONS APPLY: [ ] All Year [X] Seasonal from June 1 to October 31

Outfall Number 001

EFFLUENT LIMITATIONS

[X] Flow	30 day arithmetic mean	0.165	[X] MGD [ ] GPD		
[ ] BOD, 5 - Day	30 day arithmetic mean		mg/l and		lbs/day[1]
[ ] BOD, 5 - Day	7 day arithmetic mean		mg/l and		lbs/day
[ ] UOD[2]			mg/l and		lbs/day
[ ] Solids, Suspended	30 day arithmetic mean		mg/l and		lbs/day[1]
[ ] Solids, Suspended	7 day arithmetic mean		mg/l and		lbs/day
[X] Effluent disinfection required: [X] All Year [ ] Seasonal from			to		
[X] Coliform, Fecal	30 day geometric mean shall not exceed 200/100 ml				
[X] Coliform, Fecal	7 day geometric mean shall not exceed 400/100 ml				
[X] Chlorine, Total Residual	Daily Maximum		0.1		mg/l
[X] pH	Range		6.5 to 8.5		SU
[X] Solids, Settleable	Daily Maximum		0.1		ml/l
[X] Ammonia	Daily Maximum		1.5 mg/l as NH_3		
[X] CBOD, 5-Day	Daily Maximum		5.0 mg/l		
[X] Suspended Solids	Daily Maximum		10 mg/l		
[X] Dissolved Oxygen	Daily Minimum		7.0 mg/l		
[X] Phosphorus, Total	30 Day Average		0.5 mg/l as P		

MONITORING REQUIREMENTS

Parameter	Frequency	Sample Type	Sample Location Influent	Sample Location Effluent
[X] Flow, [X] MGD [ ] GPD	Continuous	Recorder	X	
[X] CBOD, 5 - Day, mg/l	1/month	6 hr. Comp.	X	X
[X] Solids, Suspended, mg/l	1/month	6 hr. Comp.	X	X
[X] Coliform, Fecal, No./100 ml[3]	1/month	Grab		X
[ ] Nitrogen, TKN (as N), mg/l				
[X] Ammonia (as NH_3), mg/l	1/month	6 hr. Comp.		X
[X] pH, SU (standard units)	1/day	Grab	X	X
[X] Solids, Settleable, ml/l	1/day	Grab	X	X
[X] Chlorine, Total Residual, mg/l[3,4]	1/day	Grab		X
[X] Phosphorus, Total (as P), mg/l	1/month	6 hr. Comp.		X
[X] Temperature, Deg. F	1/day	Grab	X	X
[X] Dissolved Oxygen, mg/l	1/day	Grab		X
[ ]				

NOTES:
(1) and effluent value shall not exceed ___ % and ___ % of influent values for $CBOD_5$ & TSS respectively.
(2) Ultimate Oxygen Demand shall be computed as follows:
UOD = 1 ½ x $CBOD_5$ + 4 ½ x TKN (Total Kjeldahl Nitrogen)
(3) Monitoring of these parameters is only required during the period when disinfection is required. The operator/permittee shall physically inspect the disinfection equipment daily to insure it is operating properly and must maintain a written log of the inspections.
(4) If Chlorine is used for disinfection.

Issued 8/5/99

FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning six months from the date of NYCDEP certification of "functional completion" of the facility's upgrade as required by the facility's Final Upgrade Plan the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

LIMITATIONS APPLY: [ ] All Year [X] Seasonal from November 1 to May 31

Outfall Number 001

EFFLUENT LIMITATIONS

[X] Flow	30 day arithmetic mean	0.165	[X] MGD	[ ] GPD	
[ ] BOD, 5 - Day	30 day arithmetic mean		mg/l and		lbs/day(1)
[ ] BOD, 5 - Day	7 day arithmetic mean		mg/l and		lbs/day
[ ] UOD(2)			mg/l and		lbs/day
[ ] Solids, Suspended	30 day arithmetic mean		mg/l and		lbs/day(1)
[ ] Solids, Suspended	7 day arithmetic mean		mg/l and		lbs/day
[X] Effluent disinfection required:	[X] All Year [ ] Seasonal from		to		
[X] Coliform, Fecal	30 day geometric mean shall not exceed 200/100 ml				
[X] Coliform, Fecal	7 day geometric mean shall not exceed 400/100 ml				
[X] Chlorine, Total Residual	Daily Maximum	0.1			mg/l
[X] pH	Range	6.5 to 8.5			SU
[X] Solids, Settleable	Daily Maximum	0.1			ml/l
[X] Ammonia	Daily Maximum	2.0 mg/l as NH_3			
[X] CBOD, 5-Day	Daily Maximum	5.0 mg/l			
[X] Suspended Solids	Daily Maximum	10 mg/l			
[X] Dissolved Oxygen	Daily Minimum	7.0 mg/l			
[X] Phosphorus, Total	30 Day Average	0.5 mg/l as P			

MONITORING REQUIREMENTS

Parameter	Frequency	Sample Type	Sample Location Influent	Sample Location Effluent
[X] Flow, [X] MGD [ ] GPD	Continuous	Recorder	X	
[X] CBOD, 5 - Day, mg/l	1/month	6 hr. Comp.	X	X
[X] Solids, Suspended, mg/l	1/month	6 hr. Comp.	X	X
[X] Coliform, Fecal, No./100 ml(3)	1/month	Grab		X
[ ] Nitrogen, TKN (as N), mg/l				
[X] Ammonia (as NH_3), mg/l	1/month	6 hr. Comp.		X
[X] pH, SU (standard units)	1/day	Grab	X	X
[X] Solids, Settleable, ml/l	1/day	Grab	X	X
[X] Chlorine, Total Residual, mg/l(3,4)	1/day	Grab		X
[X] Phosphorus, Total (as P), mg/l	1/month	6 hr. Comp.		X
[X] Temperature, Deg. F	1/day	Grab	X	X
[X] Dissolved Oxygen, mg/l	1/day	Grab		X
[ ]				

NOTES:
(1) and effluent value shall not exceed ___ % and __ % of influent values for $CBOD_5$ & TSS respectively.
(2) Ultimate Oxygen Demand shall be computed as follows:
UOD = 1 ½ x $CBOD_5$ + 4 ½ x TKN (Total Kjeldahl Nitrogen)
(3) Monitoring of these parameters is only required during the period when disinfection is required. The operator/permittee shall physically inspect the disinfection equipment daily to insure it is operating properly and must maintain a written log of the inspections.
(4) If Chlorine is used for disinfection.

FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FOR PATHOGEN REDUCTION

During the period beginning six months from the date of NYCDEP certification of "functional completion" of the facility's upgrade, as required in the facility's Final Upgrade Plan the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

Outfall Number & Effluent Parameter	Discharge Limitations Daily Avg.	Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Sample Type
001					
Giardia Lamblia, Cysts	(Note 1)		NA	NA	NA
Enteric Viruses	(Note 2)		NA	NA	NA
Turbidity	(Note 3)		NTU	Continuous	Recorder (After microfiltration/equivalent)
Chlorine Residual	(Note 4)		Mg/l	1/Day	Grab (Chlorine contact tank prior to dechlorination)

Note 1 - Facility must be capable of achieving a 99.9% removal and/or inactivation of giardia lamblia cysts. Capability shall be demonstrated by maintaining the turbidity and chlorine levels specified and operating the microfiltration unit and the disinfection system on a continuous basis, in accordance with the provisions set forth in the WWTP's Operation and Maintenance Manual.

Note 2 - Facility must be capable of achieving 99.99% removal/inactivation of enteric viruses. Capability shall be demonstrated as stated above in Note 1.

Note 3 - The turbidity levels shall be maintained at less than or equal to 0.5 NTU in 95% of the measurements taken each month and an instantaneous maximum of 5.0 NTU.

Note 4 - When chlorine is used for disinfection, a minimum residual of 0.2 mg/l shall be maintained in the chlorine contact tank prior to dechlorination.

FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FOR PATHOGEN REDUCTION

During the period beginning 9/9/1997 and lasting until 10/31/1999 the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

DISCHARGE AUTHORIZED FOR THE MONTHS APRIL 1 THRU OCTOBER 31 ONLY

Outfall Number & Effluent Parameter	Discharge Limitations Daily Avg.	Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Sample Type
002					

Up to 30,000 GPD of treated final effluent from Outfall 001 may be diverted for a pilot test to irrigate lawns and shrubs on Permittee's property. All effluent limitation as contained on Page #5 shall be complied with. Construction and operation shall be consistent with approvals obtained from the Putnam County Health Department, New York City Department of Environmental Protection and the New York State Health Department.

RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS

a) The permittee shall also refer to the General Conditions (Part II) of this permit for additional information concerning monitoring and reporting requirements and conditions.

b) The monitoring information required by this permit shall be summarized, signed and retained for a period of three years from the date of the sampling for subsequent inspection by the Department or its designated agent. Also;

[X] (if box is checked) monitoring information required by this permit shall be summarized and reported by submitting completed and signed Discharge Monitoring Report (DMR) forms for each 1 month reporting period to the locations specified below. Blank forms are available at the Department's Albany office listed below. The first reporting period begins on the effective date of this permit and the reports will be due no later than the 28th day of the month following the end of each reporting period.

Send the original (top sheet) of each DMR page to:

Department of Environmental Conservation
Division of Water
Bureau of Watershed Compliance Programs
50 Wolf Road
Albany, New York 12233-3506

Phone: (518) 457-3790

Putnam Co. Health Dept.
4 Geneva Road
Brewster, NY 10501

Send the first copy (second sheet) of each DMR page to:

Department of Environmental Conservation
Regional Water Engineer
Region 3
200 White Plains Road - 5th Floor
Tarrytown, NY 10591-5805

c) A monthly "Wastewater Facility Operation Report..." (form 92-15-7) shall be submitted (if box is checked) to the [X] Regional Water Engineer and/or [X] County Health Department or Environmental Control Agency listed above.

d) Noncompliance with the provisions of this permit shall be reported to the Department as prescribed in the attached General Conditions (Part II).

e) Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

f) If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR Part 136 or as specified in this permit, the results of this monitoring shall be included in the calculations and recording on the Discharge Monitoring Reports.

g) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this permit.

h) Unless otherwise specified, all information recorded on the Discharge Monitoring Report shall be based upon measurements and sampling carried out during the most recently completed reporting period.

i) Any laboratory test or sample analysis required by this permit for which the State Commissioner of Health issues certificates of approval pursuant to section five hundred two of the Public Health Law shall be conducted by a laboratory which has been issued a certificate of approval. Inquiries regarding laboratory certification should be sent to the Environmental Laboratory Accreditation Program, New York State Health Department Center for Laboratories and Research, Division of Environmental Sciences, The Nelson A. Rockefeller State Plaza, Albany, New York 12201.

Appendix C

1998 & 1999
WWTP Operations Data Summary

APPENDIX C.1

WATCHTOWER TRACT & BIBLE SOCIETY INC., PATTERSON NEW YORK
WWTF OPERATIONS SUMMARY
1998 TABLE I

PARAMETER	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	12-MONTH AVERAGE	PERMIT LIMIT OR DESIGN	% CAPACITY BASED ON 12-MONTH AVERAGE 01/98-12/98
INFLUENT LOADINGS															
1. HYDRAULIC															
Average-Daily Flow (MGD)	0.084	0.090	0.089	0.089	0.092	0.088	0.092	0.092	0.087	0.088	0.083	0.081	0.088	0.165	53%
2. ORGANIC															
Average Day 5-Day CBOD (mg/l)	278	271	333	306	620	348	348	292	255	341	297	304	333		
Average-Day 5-Day CBOD (lb/day)	195	203	247	227	476	255	267	224	185	250	206	205	245	369	66%
Average-Day TSS (mg/l)	213	241	230	210	264	241	349	131	247	230	199	177	228		
Average-Day TSS (lb/day)	149	181	171	156	202	177	268	100	179	169	138	120	167	450	37%
PRIMARY CLARIFIERS (one in service)															
1. SURFACE OVERFLOW RATES															
Average-Daily Flow (gal/day/sf)	420	450	445	445	460	440	460	460	435	440	415	405	440	413	106%
2. PRIMARY EFFLUENT															
Average-Day CBOD (mg/l)	144	123	166	181	166	91	116	111	143	190	150	160	145		
Average-Day CBOD (lb/day)	101	92	123	134	127	67	89	85	3	139	104	108	98		
Average-Day BOD (mg/L)	176	150	202	221	202	111	141	135	174	232	183	195	177		
Average-Day TSS (mg/l)	114	105	98	103	106	87	88	87	96	94	101	105	99		
Average-Day TSS (lb/day)	80	79	73	76	81	64	ND	67	70	69	70	71	67		
3. AVERAGE REMOVAL EFFICIENCIES															
CBOD (%)	48	55	50	41	73	74	67	62	44	44	49	47	55%		
TSS (%)	46	56	57	51	60	64	ND	34	61	59	49	41	48%		
AERATION BASINS															
1. MLSS (mg/l)	3419	3576	3827	3429	3459	3801	3344	3029	3808	3554	4147	3018	3534	4300	82%
2. F/M MLSS															
1 Unit (day -1)	0.044	0.039	0.048	0.058	0.055							0.053	0.050	0.050	99%
2 Unit (day -1)						0.036	0.055	0.058	0.056	0.081	0.052		0.056	0.050	112%
3. VOL. BOD LOADING															
1 Unit (lb/day/1000cf)	9.4	8.6	11.5	12.5	11.9							10.1	10.6	13.5	79%
2 Unit (lb/day/1000cf)						8.6	11.4	10.9	13.3	17.9	13.3		12.6	13.5	93%
4. Waste Activated Sludge (lbs/day)	70.5	57.3	76.7	71.7	62.2	113.7	115.0	97.3	101.8	94.7	129.7	73.7	88.7		
5. HYDRAULIC DETENTION TIME															
1 Unit (hours)	28.0	26.1	26.4	26.4	25.6							29.0	26.9	19.5	72%
2 Unit (hours)						19.4	18.5	18.5	19.6	19.4	20.5		19.3	19.5	101%
6. MEAN CELL RESIDENCE TIME (day)	39.6	51.0	40.8	39.1	45.5	27.3	23.8	25.4	30.6	30.7	26.1	33.5	34.4	23.0	
7. UNITS IN SERVICE	2.0	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0			
SECONDARY CLARIFIERS															
1. SURFACE OVERFLOW RATES															
Average-Daily Flow (gal/day/sf) 2 Unit	155.6	166.7	164.8	164.8	170.4							150.0	162.0	305.0	53%
Average-Daily Flow (gal/day/sf) 1 Unit						325.9	340.7	340.7	322.2	325.9	307.4		327.2	305.0	107%
SECONDARY EFFLUENT CHARACTERISTICS (2 filter units on line)															
1. TOTAL SUSPENDED SOLIDS (mg/L)	6.0	4.0	3.0	3.0	3.0	3.0	2.0	4.0	5.0	6.0	7.0	5.0	4.3		
2. FILTER LOADING RATE (gpm/sf)	0.63	0.68	0.67	0.67	0.69	0.66	0.69	0.69	0.65	0.66	0.62	0.61	0.7	5.0	13% @ ave Q

APPENDIX C.1

WATCHTOWER TRACT & BIBLE SOCIETY INC., PATTERSON NEW YORK
WWTF OPERATIONS SUMMARY
1998 TABLE I

PARAMETER	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	12-MONTH AVERAGE	PERMIT LIMIT OR DESIGN	% CAPACITY BASED ON 12-MONTH AVERAGE 01/98-12/98
FINAL EFFLUENT CHARACTERISTICS															
1. CARBONACEOUS BOD															
(mg/l)	2.0	2.0	2.0	2.6	3.0	2.3	2.2	2.0	2.0	2.0	2.0	2.0	2.2	5.0	Maximum
(lb/day)	1.4	1.5	1.5	1.9	2.3	1.7	1.7	1.5	1.5	1.5	1.4	1.4	1.6	6.9	Maximum
Average Monthly Removal Efficiency (%)	99.3	99.3	99.4	99.2	99.5	99.3	99.4	99.3	99.2	99.4	99.3	99.3	99.3	85.0	Minimum
2. TOTAL SUSPENDED SOLIDS															
(mg/l)	1.0	1.0	1.0	1.0	1.4	1.5	1.8	1.0	1.4	1.0	1.0	1.0	1.2	10.0	Maximum
(lb/day)	0.7	0.8	0.7	0.7	1.1	1.1	1.4	0.8	1.0	0.7	0.7	0.7	0.9	13.8	Maximum
Average Monthly Removal Efficiency (%)	99.3	99.4	99.4	99.4	99.3	99.2	99.3	99.0	99.2	99.4	99.3	99.2	99.3	85.0	Minimum
3. AMMONIA (mg/l)	0.1	0.1	1.0	1.0	0.1	0.1	0.1	0.1	1.0	0.1	0.1	1.4	0.4	2.0	Maximum
4. DISSOLVED OXYGEN (mg/l)	8.6	8.5	8.6	8.1	7.5	7.1	7.2	7.1	7.3	7.7	7.9	8.4	7.8	7.0	Minimum
5. EFFLUENT PHOSPHORUS (mg/l)	0.5	0.6	0.4	0.7	0.5	0.4	0.5	0.3	0.3	0.4	0.3	0.3	0.4	1.0	Maximum
6. pH (su) minimum	6.9	6.9	6.9	7.0	6.9	6.7	6.8	6.7	6.8	6.5	6.8	6.7		6.0	Minimum
maximum	7.6	7.9	8.0	8.0	8.0	7.9	7.8	8.0	7.7	8.2	7.6	7.6		9.0	Maximum
7. Fecal Coliform (#/100 ml)	0.0	0.0	4.0	0.0	1.0	2.0	0.0	4.0	4.0	0.0	0.0	5.0	1.7	200.0	Maximum

APPENDIX C.2

WATCHTOWER TRACT & BIBLE SOCIETY INC., PATTERSON NEW YORK
WWTF OPERATIONS SUMMARY
1999 TABLE II

PARAMETER	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	12-MONTH AVERAGE	PERMIT LIMIT OR DESIGN	*% CAPACITY* BASED ON 12-MONTH AVERAGE 01/99-12/99
INFLUENT LOADINGS															
1. HYDRAULIC															
Average-Daily Flow (MGD)	0.078	0.083	0.087	0.089	0.098	0.101	0.095	0.094	0.106	0.099	0.098	0.091	0.093	0.165	57%
2. ORGANIC															
Average Day 5-Day CBOD (mg/l)	323	303	304	267	342	334	312	273	270	271	323	310	303		
Average-Day 5-Day CBOD (lb/day)	210	210	220	198	279	281	247	214	239	224	264	235	235	369	64%
Average-Day TSS (mg/l)	234	239	263	249	343	237	185	380	370	220	350	230	275		
Average-Day TSS (lb/day)	152	165	191	185	280	200	147	298	327	182	286	174	216	450	48%
PRIMARY CLARIFIERS (one in service)															
1. SURFACE OVERFLOW RATES															
Average-Daily Flow (gal/day/sf)	390	415	435	445	490	505	475	470	530	495	490	455	466	413	113%
2. PRIMARY EFFLUENT															
Average-Day CBOD (mg/l) (1998 data)	144	123	166	181	166	91	116	111	143	190	150	160	145		
Average-Day CBOD (lb/day)	94	85	120	134	136	77	92	87	3	157	123	121	102		
Average-Day BOD (mg/l) (1998 data)	176	150	202	221	202	111	141	135	174	232	183	195	177		
Average-Day TSS (mg/l)	108	99	124	101	107	155	ND	80	110	105	125	130	104		
Average-Day TSS (lb/day)	70	69	90	75	87	131	ND	63	97	87	102	99	81		
3. AVERAGE REMOVAL EFFICIENCIES															
CBOD (%)	55	59	45	32	51	73	63	59	47	30	54	48	51%		
TSS (%)	54	59	53	59	69	35	100	79	70	52	64	43	61%		
AERATION BASINS															
1. MLSS (mg/l)	2980	2669	3203	3341	3460	3729	3802	3928	4113	4246	4097	3893	3622	4300	84%
2. F/M MLSS															
1 Unit (day -1)	0.047	0.048	0.056	0.060	0.059								0.054	0.050	108%
2 Unit (day -1)						0.042	0.050	0.046	0.063	0.076	0.062	0.064	0.058	0.050	115%
3. VOL. BOD LOADING															
1 Unit (lb/day/1000cf)	8.7	7.9	11.2	12.5	12.6								10.6	13.5	78%
2 Unit (lb/day/1000cf)						9.8	11.8	11.2	16.2	20.1	15.7	15.6	14.4	13.5	106%
4. Waste Activated Sludge (lbs/day)	65.0	63.9	62.5	67.9	61.9	76.8	104.9	105.9	125.0	115.9	123.4	119.0	91.0		
5. HYDRAULIC DETENTION TIME															
1 Unit (hours)	30.2	28.3	27.0	26.4	24.0								27.2	19.5	72%
2 Unit (hours)						16.9	17.9	18.1	16.1	17.2	17.4	18.7	17.5	19.5	112%
6. MEAN CELL RESIDENCE TIME (day)	37.5	34.1	41.9	40.2	45.7	39.7	21.5	22.0	19.5	21.7	19.7	19.4	30.2	23.0	
7. UNITS IN SERVICE	2.0	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0			
SECONDARY CLARIFIERS															
1. SURFACE OVERFLOW RATES															
Average-Daily Flow (gal/day/sf) 2 Unit	144.4	153.7	161.1	164.8	181.5	187.0							165.4	305.0	54%
Average-Daily Flow (gal/day/sf) 1 Unit							351.9	348.1	392.6	366.7	363.0	337.0	359.9	305.0	118%
SECONDARY EFFLUENT CHARACTERISTICS (2 filter units on line)															
1. TOTAL SUSPENDED SOLIDS (mg/L)	3.0	5.0	4.0	4.0	3.0	4.0	4.0	6.0	7.0	8.0	9.0	9.0	5.5		
															14% @ ave Q

APPENDIX C.2

WATCHTOWER TRACT & BIBLE SOCIETY INC., PATTERSON NEW YORK
WWTF OPERATIONS SUMMARY
1999 TABLE II

PARAMETER	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	12-MONTH AVERAGE	PERMIT LIMIT OR DESIGN	% CAPACITY BASED ON 12-MONTH AVERAGE 01/99-12/99
FINAL EFFLUENT CHARACTERISTICS															
1. CARBONACEOUS BOD															
(mg/l)	2.0	2.0	2.0	2.0	2.0	2.0	3.0	2.1	2.0	2.1	2.0	2.0	2.1	5.0	Maximum
(lb/day)	1.3	1.4	1.5	1.5	1.6	1.7	2.4	1.6	1.8	1.7	1.6	1.5	1.6	6.9	Maximum
Average Monthly Removal Efficiency (%)	99.4	99.3	99.3	99.3	99.4	99.4	99.0	99.2	99.3	99.2	99.4	99.4	99.3	85.0	Minimum
2. TOTAL SUSPENDED SOLIDS															
(mg/l)	1.0	1.3	1.3	1.0	2.0	3.0	1.0	1.0	1.0	3.0	1.0	2.0	1.6	10.0	Maximum
(lb/day)	0.7	0.9	0.9	0.7	1.6	2.5	0.8	0.8	0.9	2.5	0.8	1.5	1.2	13.8	Maximum
Average Monthly Removal Efficiency (%)	99.3	99.2	99.3	99.5	99.3	98.5	99.3	99.7	99.7	98.3	99.7	98.9	99.2	85.0	Minimum
3. AMMONIA (mg/l)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	2.0	Maximum
4. DISSOLVED OXYGEN (mg/l)	9.2	8.8	8.9	8.4	7.9	7.5	7.2	7.2	7.5	8.1	8.5	9.0	8.2	7.0	Minimum
5. EFFLUENT PHOSPHORUS (mg/l)	0.3	0.2	0.3	0.3	0.2	0.5	0.4	0.4	0.7	0.7	0.5	0.3	0.4	1.0	Maximum
6. pH (su) minimum	6.7	6.2	6.9	6.9	6.7	6.7	6.8	6.7	6.9	6.8	6.8	7.0		6.0	Minimum
maximum	7.8	7.8	7.5	7.4	8.0	7.5	7.5	7.5	7.7	7.8	7.6	7.8		9.0	Maximum
7. Fecal Coliform (#/100 ml geometric mean)	0.0	19.0	0.0	0.0	1.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0	1.8	200.0	Maximum

Appendix D

Technical Specifications Outline

Appendix D

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Technical Specifications

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Appendix E

Dual Sand™ Filter Proposal (Proprietary)

Memcor CMF Membrane Filter Proposal

SIEWERT EQUIPMENT CO. INC.

August 14, 2000

Mr. Jeff McDonald
Dufresne - Henry, P.C.
60 Commerce St.
Williston, VT 05495

Ref: DualSand™ – NYC Watershed Upgrade Program - Watchtower

We are pleased to provide this general information, preliminary selection and budgetary pricing for a DualSand™ system for 363,000 GPD with a peak flow capacity of 432,000 GPD including reject.

For this application, we feel that the DualSand™ has specific advantages over membranes in that:

- As per the NYC DEP equivalency determination, there is **no** sand filter required in front of the DualSand™ system.
- The DualSand™ will be approved for disinfection in an upcoming Technical Bulletin. If there is an existing chlorine contact tank, it may be used for dechlorination or post aeration.
- The redundant filtration train does not have to be stored in solution, as does the membrane unit. This may not sound like much, but the need to sequence and use the redundant membrane unit during maintenance, CIP, and /or backwash cycles makes this problematic for the operator. In addition, the possibility of improper storage of the membrane may void the warrantee. The costs associated with improper operation may be born by the owner.
- The existing membrane plants within the NYC watershed have experienced problems of fouling caused by the chemical addition required to remove phosphorous. The removal of phosphorous to the low levels required in the MOA, demands chemical addition and sand filtration prior to the membranes. The resulting fouling and difficulty in cleaning the membranes have proven to be problematic for the operators and have resulted in significant fines. The DualSand™ is not affected by such fouling.
- **The Stamford Report is now available on NYC DEP website.** This report provides historical information on the DualSand™ from previous pilots as well as the side-by-side evaluation to membranes. This report shows that the DualSand™ is more reliable, uses less energy, and produces an effluent significantly better than required by the SPDES permits.

ALBANY
244 First Street
Troy, NY 12180
(518) 272-3431 phone
(518) 272-4406 fax

ROCHESTER
175 Akron Street
Rochester, NY 14609
(716) 482-9640 phone
(716) 482-4149 fax

BUFFALO
338 Harris Hill Road
Williamsville, NY 14221
(716) 692-1107 phone
(716) 692-1821 fax

General Information:

The DualSand™ is sold on an **installed basis only**. This is done to provide quality control, sole source responsibility, performance guarantee, maintain schedule integrity and retain intellectual property. The installation portion of the DualSand™ price includes field labor at prevailing wage rates. A concrete slab, wet well, power to our main panel, clarified wastewater piped to the wet well, reject water piped to another process (reject header is provided by DSS) and a superstructure with lighting and HVAC is to be provided by others. Please refer to the enclosed drawings.

The DualSand™ was piloted from 1995 to 1997 in the NYC Watershed at 50,000 GPD. During these pilot tests there were no operating or performance problems of any significance reported. The process underwent over 20 spike challenges of Crypto and Giardia cysts, with no detections. The microfiltration technology did have detections as noted in the EPA and DEP documents due to membrane failure in their only spike challenge.

Performance is a critical issue because the owner and operator are subject to fines and legal actions by NYS DEC for violating the SPDES permit levels. NYC DEP is not required to reimburse any such fines or assume any liability in any such legal action. DSS Environmental Inc. will indemnify the engineer and owner of such fines provided the system is operated under DSS supervision. We suggest that you contact the operators and the facilities below to obtain a better understanding of the systems reliability and ease of maintenance:

Stamford, NY - 300,000 GPD - Gary Paine - 607 652 7477
Onteora School - 20,000 GPD - Tim Cornelison - 518 263 5128 (modified DualSand™)

The technical specifications of the NYC DEP Upgrade program state that the microfiltration or NYC DEP approved equivalent must produce a BOD5 <1.0 mg/l and have integrity testing capability. We have enclosed the independent BOD testing data from the Stamford Pilot Test to support the BOD performance requirement. The integrity testing system is being provided via a particle counter on the DualSand™ filtrate header.

In your initial evaluation you should be aware that the NYS DOH, DEC, DEP and EPA have approved the DualSand™ for providing over 15 minutes of chlorine contact time. The DualSand™ provides automatic back up of the sodium hypo feed system and if used for disinfection provides a residual chlorine monitor and recorder for confirmation. We can add a dechlorination system and post aeration system as an option for the DualSand™ scope of supply.

In the evaluation of the two technologies we offer these known advantages of DualSand™ over microfiltration for your consideration:

a. Lower energy - see typical Zimpro / Memcor package comparison

b. Lower maintenance - see typical Zimpro / Memcor package comparison

c. Simple operations and maintenance - The DualSand™ package consists of influent pumps, chemical-metering pumps, DynaSand filters (airlift) and an air compressor. All of these components are familiar to most wastewater operators. They are simple and easy to repair. The most complex controls are the influent pump controls using relay logic (Pump On / Off). Every wastewater operator is familiar with such.

Operators are not familiar with the process of having to plug failed membranes, clean or repair conductivity probes for CIP, and trouble shooting a PLC based controller used to sequence valves, gas and CIP cleaning, and for membrane integrity testing. In short, the operator needs to dial 911 and get out his checkbook, because he can not fix a problem with the membrane units.

d. All of the components used in the DualSand™ have been used in wastewater applications for over 20 years. There are over 2,500 DynaSand filters in wastewater application in North America. Most of these applications have **pumped** influent to the DynaSand filters. To electrically interlock the chemical feed system with the influent pumps is simple technology and avoids flow pacing of the chemical.

e. Chemical dosing of the DualSand™ system is less critical than that of the sand filter / membrane option. The coagulants required to remove phosphorous in the sand filters in front of the membrane units can foul / blind the membranes, as recently happened in Tannersville and Margaretville. Similar problems would likely exist in Grahamsville if the flow were to be 180,000 GPD, instead of the 60,000 GPD or if they had 3-4 membrane units instead of 10. When the membranes foul, the units go in to a CIP cycle and bypass the membrane units. There is no bypass, CIP cleaning or backwash cycles required for the DualSand™.

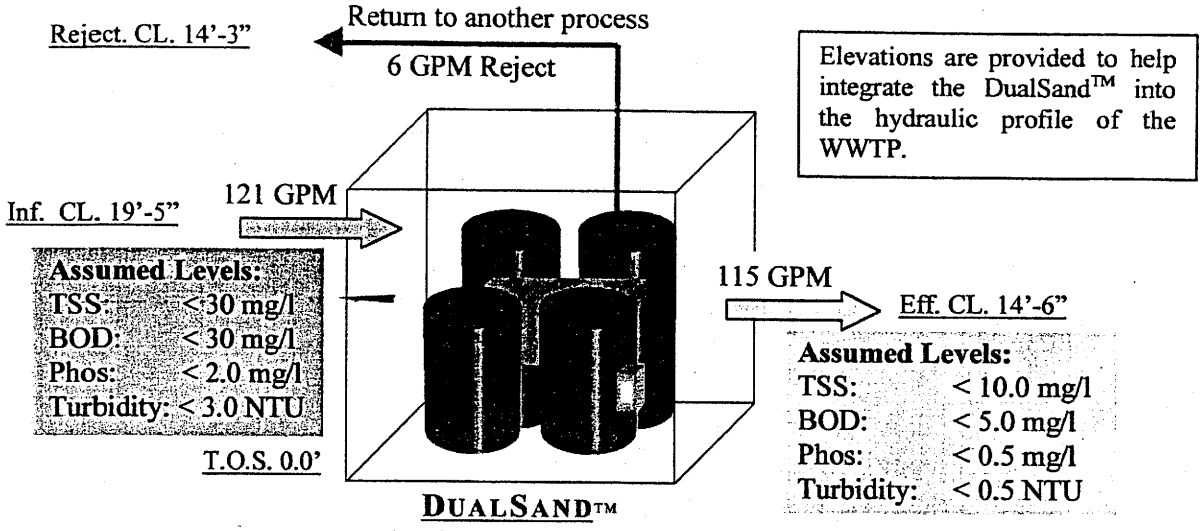
f. Conservative design - The loading rate of 3.00 GPM /SF is conservative. Most of the pilot tests and DynaSand filters in operation have proven to provide excellent filtration at rates up to 6.00 GPM / SF. Applications outside of the NYC Watershed use a loading rate of 4-5.0 GPM / SF.

g. **No proprietary components or software in the DualSand™.** The DualSand™ is a proprietary process, but uses all conventional components. This equates to low O & M which is important to the owner because NYC DEP will only pay O&M until DEC lowers the SPDES permit levels in future.

1. PRELIMINARY DESIGN

- **Permitted Flow:** 165,000 GPD (115 GPM + 6 GPM $_{5\% \text{ reject}}$ = 121 GPM)
- **Peak Flow:** 363,000 GPD (252 GPM + 13 GPM$_{5\% \text{ reject}}$ = 265 GPM)
- **BOD & TSS to the DualSand™:** <30 mg/l
- **Phosphorous to the DualSand™:** <2 mg/l
- **Redundancy:** Per NYC DEP–(3) trains each capable of 50% of flow

- **Maximum Loading Rate:** **3.00** GPM / SF as per NYC DEP - this applies to the filters in front of the microfiltration as well.



FILTER SELECTION:

Permitted Daily Flow: 165,000 GPD / 1440 = 115 GPM + 6 GPM $_{reject}$ = 121 GPM

Filter Area Provided: 50 SF x 2 = 100 SF

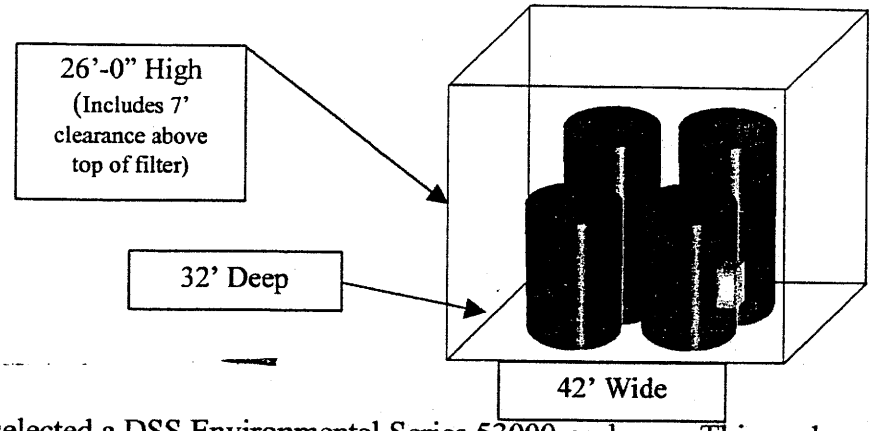
Peak Flow Capacity: 100 SF x 3.00 GPM/SF = 300 GPM - 15 GPM $_{reject}$ = 285 GPM
285 GPM > 265 GPM Okay

Selected DSS Series 53000, which consists of (2) operating filtration train of 50 SF + (1) redundant train.

The Influent pumps will be selected to provide a flow of approximately 300 GPM @ 30' TDH. The feed pumps will be activated by liquid level controls in a wet well that receives clarified secondary wastewater. If the flow from the WWTP is less than 300 GPM then the level in the wet well will lower until it reaches a pump off level. The pumps will remain off until the water level has reached the "Pump On" level.

VFDs and chemical flow pacing can be added to the DualSand™ process if your customer prefers. The cost of the DualSand™ will have to be increased to cover the VFDs and streaming current monitor.

3. CAPITAL COSTS OF THE DUALSAND™



We have selected a DSS Environmental Series 53000 package. This package consists of the following equipment and services:

(6) Parkson DynaSand filters with stainless steel tank construction, sand, controls, covers and freight
(1) Ingersoll-Rand (2) head air compressor with reservoir
(1) Influent duplex package pump station w/ controls
(4) Chemical feed pumps with controls for automatic back-up
(2) Chemical day tanks (Double wall so no containment req'd)
(1) Static mixer
(5) Turbidimeters
(1) Air pressure sensor
(1) Residual chlorine monitor and chart recorder
(1) Particle counter
(3) Flow meters
(1) Piping – All piping of influent, reject, filtrate, air, chlorine and polymer, mixer, flow splitter box.
(1) Electrical wiring & conduit to pumps, filter controls, air compressor
(1) Freight to job site is included for sand and all equipment described herein
(1) Engineering of DualSand™ system, platforms, stairs, piping, etc.
(1) Start-up and training – [(1) month or (26) working days
(1) Mobilization for DSS crew and equipment

Budget pricing for the above **installed** DualSand™ Series 53000 is… **$ 960,000 to 1,005,000***

* Site, building foundation and slab, building / enclosure, utilities, piping outside of 2' construction limit, and any item not specifically described above, are not included in the above price. Pricing depends on date of purchase, site conditions and miscellaneous options not yet defined.

Please see attached O & M sheet for projected chemical, power, and maintenance costs.

If you should have any questions, please feel free to give us a call.

With kind regards,
Siewert Equipment Co., Inc.

Terry L. Wright

O & M Costs Specific to the DualSand™ @ Watchtower Center WWTP

Watchtower will use (2) filtration trains or (4) filters. The flow is pumped to the DualSand™ at 300 GPM. The actual average daily flow is 69 GPM ([90,000 / 1440] + 6 GPM $_{reject}$). For this reason the O & equipment wear costs have been multiplied by 23% (69 GPM actual / 300 GPM pumped) to reflect actual projected operation time per day.

Maintenance items are limited to those specific to the DualSand™ and are as follows:

A. ***Airlifts*** - Each filter in operation at the stated flow will require the following;

1. Airlifts last 5-7 years and can be changed out in 30 - 45 minutes. The cost of the airlift is approximately $ 1,100 / airlift + labor (0.75 hrs. x $ 50.00 / hr.) = $ 1,138 / 5 years = $228 / year / airlift in use. [$228 x 4 airlifts] x 23% = **$ 210 / year**
2. Clean screen in airlift @ 6 month interval, 0.5 hr @ $50 / hr = $ 50 / year / airlift in use.

   $ 50 x 4 airlifts = **$ 200 / year**

B. ***Sand*** replacement is projected at 1% per year. Typical sand costs are $ 2,000 / filter at start-up with extra sand provided at that time. Assume (2) bag / year @ $ 10/ bag + 0.5 hrs. of labor @ $ 50 / hrs. = $45 / yr. / filter x 4 filters = $ 180 x 23 % = **$ 42 / year**

C. ***Metering Pumps*** - Each metering pump in use may require the following:

1. The metering head can be rebuilt for $ 70 + 1 hr. of labor ($50/hr) or $120 / yr. / pump

   $ 120 x 2 pumps x 23% = **$ 56 / year**
2. Clean and calibrate once / 3 mo. = 1 hr. @ $ 50 / hr. labor = $50 x 4 = $200 / year.

   $200 x 2 pumps = **$ 400 / year**

Metering pumps are required in the microfiltration options in the same quantity and O&M cost.

D. ***Air Compressor*** - To power the airlift

1. Change oil, air filter and grease annually. This is estimated to take (1.5) hours annually @ $ 50 / hr. + $ 20 in materials = **$ 95 / yr.**
2. Replace rings and seals every 5 years. This is estimated to take (4) hours @ $50 / hr. + $450 in parts = $650 /5 yrs. = $ 130 / annual expense $130 x 23% = **$ 30 / year**

Compressed air is required in the microfiltration option for gas cleaning & valve operation. Also they require a membrane inlet filter to prevent membrane fouling.

E. ***Influent Pumps*** - Replace (1) pump every (5) Years = $5,000/5 = $ 1,000/yr. x 23% = **$230/yr.**

Replace (1) float every (2) years = $ 120 / 2 = **$ 60 / year**

Influent pumps required in the microfiltration option for sand filters and micro units. The microfiltration pumps will be bigger and more expensive due to higher pressure.

Operating Costs:

A. Power requirement of the DualSand™ is as follows:

1. ***DualSand™ feed pumps*** - We have assumed that the pumps are located on a slab @ 0.0', need to pump to an elevation of 19.5', and the pump off elevation is 2.0' & Pump On elevation is 6.0'. We included headloss through the static mixer, pipes (4") and 1st stage filter. This gives a duty point of 300 GPM @ 30' TDH.
   300 GPM @ 30' TDH, 60% mechanical efficiency, 90% motor efficiency, 1.0 Sp. Gr.
   300 x 30 x 1.0 / 3,960 x 0.6 = 3.8 bHp x 0.7457 / 0.9 = 3.1 Kw
   3.1 Kw x 24 hrs.x 365 days/yr. = 27,493 Kw-H x $ 0.10 / Kw-H = $ 2,749/ year
   Therefore $ 2,749 x 0.23 = **$ 632**

2. ***Reject pumps*** - No reject pumps provided - flow by gravity

   Reject pumps are probably required by microfiltration

3. ***Effluent pumps*** - None required - flow by gravity

4. ***Air compressor*** to power the DynaSand™ filter airlifts.

   The airlifts in the DynaSand filters use 2.6 scfm @ 25 psi x 4 airlifts = 10.4 scfm @ 25 PSI. The total air requirement and equivalent Hp is based on the number of filters and the size of the filter. This value is then converted in to Hp using a table from the Machinery's Handbook that gives the horsepower used to compress (1) Cu.Ft. of air @ 25 PSI.

   10.4 scfm @ 25 psi = 10.4 x 0.085 = 0.88 bHp

   0.88 bHp x 0.746 / 0.9 = 0.73 Kw x 8760 hours/year = 6,419 KwH x $ 0.10 KwH = $ 642 / year

   $ 642 x 0.23 = **$ 148**

   Compressed air is required in the microfiltration option for gas cleaning & valve operation.

5. ***Metering pumps*** to add coagulant (Phosphorous removal) and chlorine

   (2) 130 Watts / 1000 x 8760 hrs/year = 2,278 KwH @ $ 0.10 = $ 228 / year x 0.23 = **$ 53**

   Metering pumps are required in the microfiltration options in the same capacity.

B. ***Chemical*** costs have **not** been included so that an accurate comparison to the microfiltration technology can be obtained. The manufacturers of microfiltration will not include chemicals even though they will be required per the MOA. An aluminum or iron based coagulant will be required for the removal of Phosphorous. Chlorine or UV (Electrical Power) will be required for disinfection. The quantity will be the same, or very similar, for either technology. This information can be provided more accurately when the Stamford Report is released or when more information is provided on the actual wastewater to be processed.

D. ***Instruments and controls;*** The MOA requires flow meters, turbidimeters, particle counters, and telemetry. The associated costs for these items are not included herein because it is not a requirement of the DualSand™ to operate, but of the MOA.

Chemical feed pumps are interlocked with influent pumps for start/stop of field adjusted flow.

Each sand filter has a NEMA 4 control to start/stop the air lift.

There is an air pressure sensor on the compressor reservoir that needs to be tied in to the dialer.

DSS Environmental provides a central power panel. From this panel DSS will provide power to the following:

Influent pumps (each): 230v/3/60 - 26.4 FLA / 8.7 Hp

Metering Pumps (each): 110v/1/60

Air Compressor: 230v/3/60 - 5 HP

Air pressure switch: 110v

Air Controllers: 110v

Summary of Annual Projected O & M Costs:

Total Annual Maintenance: $ 1,323

Total Annual Operating: $ 833 + Chemicals*

* Reference Chemical Costs:

Through out the DualSand™ Pilots we used a dosing rate for both the sodium hypochloride (15% solution) and coagulant of 1 to 3 GPD per 50,000 GPD.

Using 2 GPD x 90,000 / 50,000 GPD = 3.6 GPD

Sodium Hypochloride (15%):	3.6 GPD x $ 1.14 / gallon = $ 4.10 x 365 days =	$ 1,498
Sodium metabisulfite (38%):	2.0 GPD x $ 2.00 / gallon = $ 4.00 x 365 days =	$ 1,460
Coagulant:	3.6 GPD x $ 3.50*/gallon = $ 12.60 x 365 days =	$ 4,599

* Includes freight to site **$ 7,557 / yr.**

SPECIAL NOTES

1. A FLAT HORIZONTAL FOUNDATION MUST BE PROVIDED FOR THE FILTER TO SUPPORT THE LOADS SHOWN.
2. DSS WILL APPLY (1in.) MIN. GROUT UNDER EACH BASE PLATE AND UNDER THE CONE AT CENTER.
3. DSS ANCHOR BOLT PROJECTION TO INCLUDE GROUT, BASE PLATE (1 in.) THICK, PLUS WASHER AND NUT.

LOADING CONDITIONS STATIC LOADING

	S. BED	D. BED
FILTER FULL OF WATER AND SAND:		
LOAD UNDER EACH PAD:	13.6 KIPS	18.9 KIPS
LOAD UNDER EACH CONE AT CENTER:	13.6 KIPS	18.9 KIPS

SEISMIC FORCES FROM ZONE 4 MAY CREATE AN OVERTURNING MOMENT OF 83.9 FT-KIPS (S. BED) & 141.9 FT-KIPS (D. BED) AT THE BASE OF THE UNIT. THE LOADS ACTING ON EACH ANCHOR BOLT WILL THEN BE 1.8 KIPS (S. BED) & 5.2 KIPS (D. BED) IN TENSION AND 2.5 KIPS S. BED) & 3.5 KIPS (D. BED) IN SHEAR.

NOTES:

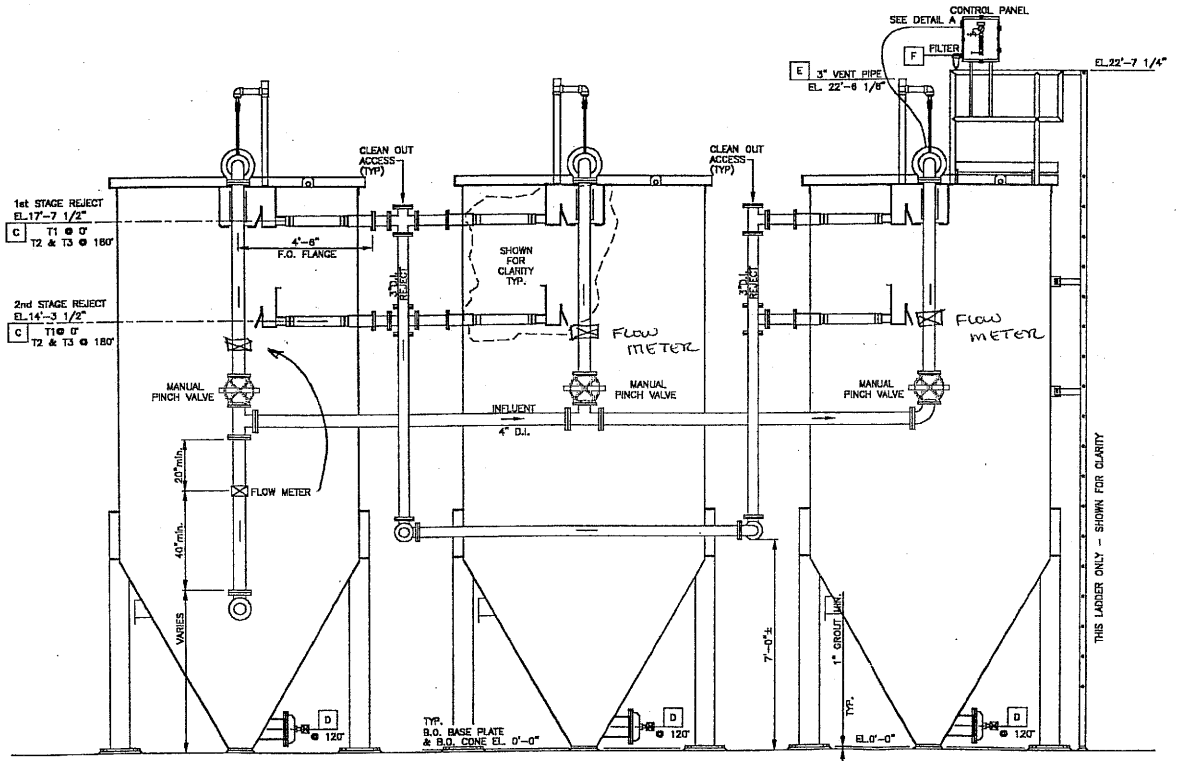
1. THIS DRAWING TO BE USED FOR GENERAL INFORMATION ONLY. NOT FOR CONSTRUCTION.
2. MATERIAL OF CONSTRUCTION:
   TANK: 11 GA., 304 S.S.
   AIRLIFT: 304 S.S.
   INFLUENT HOUSING & LOWER CONE: 304 S.S.
   LADDER AND LEGS: C.S. A36 (EPOXY PAINTED)
3. WEIGHTS:

	S.BED	D.BED
TANK EMPTY:	4,000#	4,500#
TANK W/WET SAND:	36,365#	57,040#
TANK W/ SAND & WATER:	54,400#	75,875#

4. SAND REQUIRED: 13 TONS 21.5 TONS

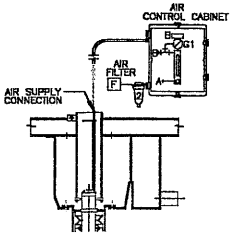
NOZZLE SCHEDULE

LTR	SIZE INCHES	RATING	FACE	SERVICE	REMARKS
A	6	150#	RF	INLET	FEED
B	6	150#	RF	OUTLET	FILTRATE
C	3	150#	RF	OUTLET	REJECT
D	1	150#	NPT	INSIDE DRAIN	VALVE
E	3	150#	NPT	VENT	PIPE
F	1/4		NPT	AIR	



VIEW B-B

SEE PLAN FOR ORIENTATION



DETAIL A INSTRUMENT PANEL TO AIRLIFT CONNECTION

SCHEMATIC N.T.S.

from DSS Environmental, Inc. a subsidiary of Ogden Water Systems, Inc.

CONTINUOUS CLEANED UPFLOW DUAL-BAND FILTRATION SYSTEM

DSS SERIES 53000

PROJECT NUMBER:

PROJECT NAME: NYC WATERSHED

DRAWING FILE NUMBER: NYC-53000

SHEET NUMBER: 3 of 3

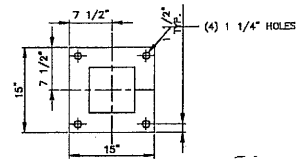
REVISIONS

BY:	DESCRIPTION BELOW:	DATE:

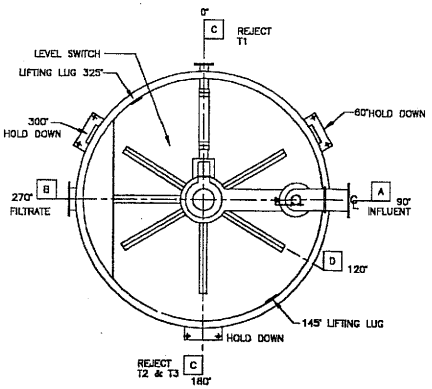
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN FEET AND INCHES TOLERANCE +/- TOL.

SIGNATURES	DATE
DRAWN: PC	7.27.00
CHECKED: MM	7.27.00
APPROVED: AS	7.27.00
SIZE: B	SCALE: 1/4" = 1'
CHECKED:	

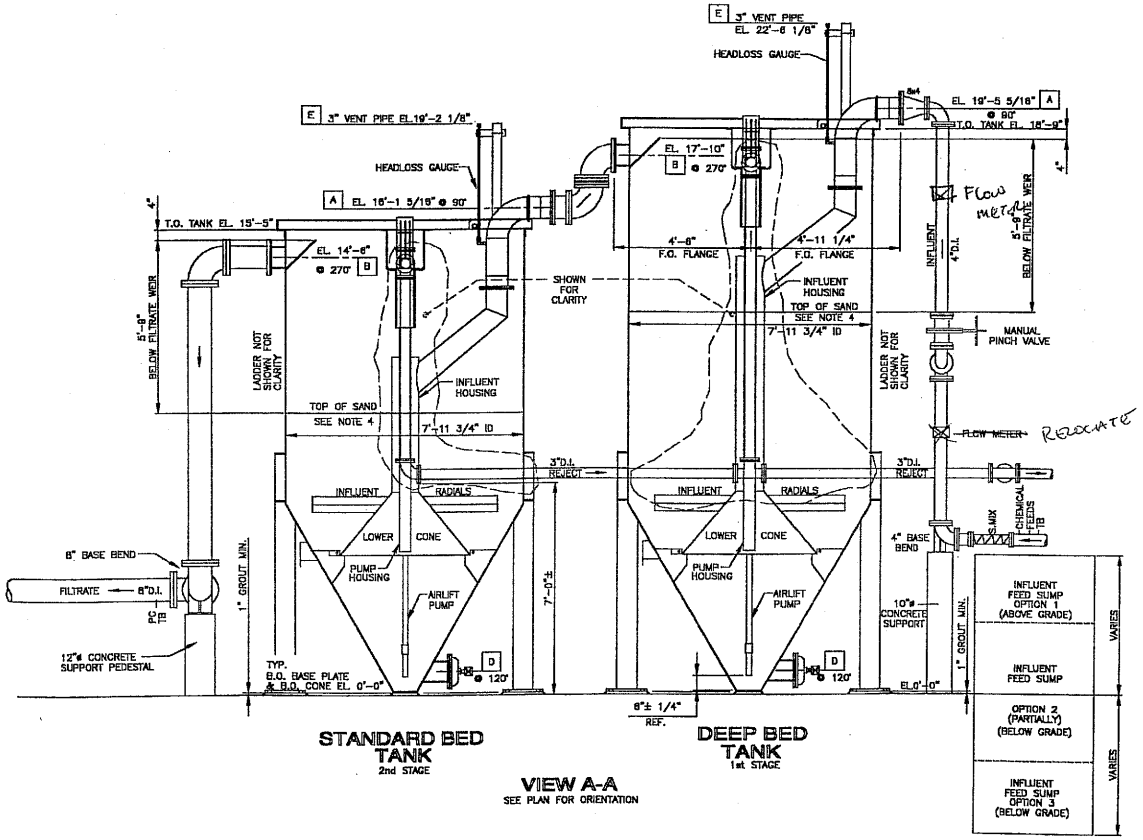
THE OWNER, PROJECT ENGINEER, AND ALL OTHERS INVOLVED WITH THE PROJECT DESIGN MUST BE FAMILIAR WITH ALL APPLICABLE CODES REQUIRED BY LOCAL, STATE AND FEDERAL LAWS WHICH INCORPORATING DSS ENVIRONMENTAL EQUIPMENT. IT IS THE RESPONSIBILITY OF THE ENGINEER FOR LOCATION AND/OR PLACEMENT OF EQUIPMENT IN THE PLANT DESIGN. NEITHER DSS ENVIRONMENTAL NOR ITS AGENTS SHALL BE RESPONSIBLE FOR ANY DAMAGE THAT RESULTS FROM THE FAILURE TO FOLLOW APPROPRIATE SAFETY PRECAUTIONS IN THE OPERATION AND MAINTENANCE OF DSS ENVIRONMENTAL EQUIPMENT.



BASE PLATE DETAIL
N.T.S.



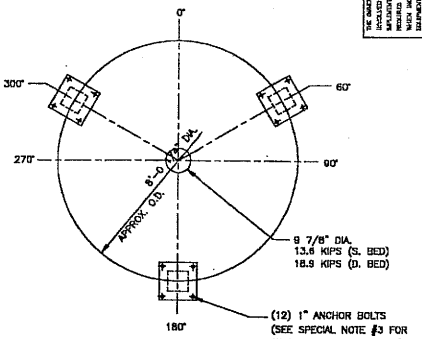
STANDARD/DEEP BED TOP VIEW SCHEMATIC



STANDARD BED TANK
2nd STAGE

DEEP BED TANK
1st STAGE

VIEW A-A
SEE PLAN FOR ORIENTATION



STANDARD/DEEP BED LOADING DIAGRAM

from
DSS Environmental, Inc.
a subsidiary of
Ogden Water Systems, Inc.

CONTINUOUS CLEANED UPFLOW
DUAL BAND FILTRATION SYSTEM
DSS SERIES 53000

PROJECT NUMBER:
PROJECT NAME: NYC WATERSHED

DRAWING FILE NUMBER: NYC-53000
SHEET NUMBER: 2 OF 3

REVISIONS

DESCRIPTION BELOW:	DATE:	BY:

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN FEET AND INCHES
TOLERANCE: +/- TOL.

SIGNATURES		DATE
DRAWN:	BC	7.27.00
CHECKED:	MM	7.27.00
APPROVED:	JO	7.27.00
SIZE: B	SCALE: 1/4" = 1'	CHECKED:

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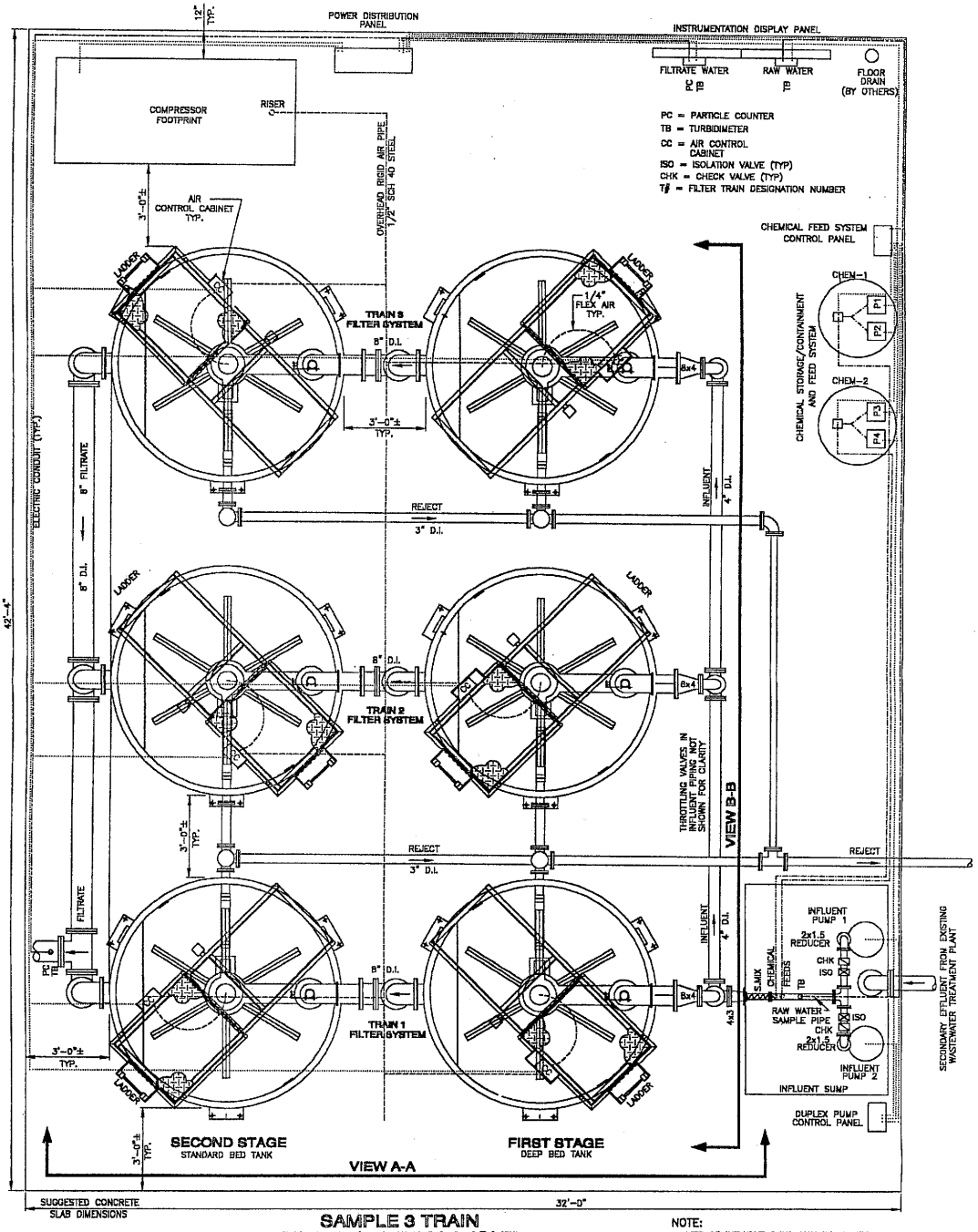

SAMPLE 3 TRAIN FILTER SYSTEM LAYOUT PLAN VIEW

NOTE:

a. SIZE OF INFLUENT SUMP MAY BE MODIFIED TO MEET EQUALIZATION REQUIREMENTS.
b. ALL SAMPLE LINE TAPS TO BE CORPORATION STOPS.
c. ALL ELECTRIC, SAMPLE AND CHEMICAL FEED LINES TO BE RUN ALONG WALLS.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN FEET AND INCHES TOLERANCE: +/- TOL.

SIGNATURES		DATE
DRAWN:	BC	7.27.00
CHECKED:	MM	7.27.00
APPROVED:	JG	7.27.00
SIZE: B	SCALE:	1/4" = 1'

REVISIONS

DATE:	BY:	CHECKED:
APPROVED:	DESCRIPTION BELOW:	

from
DSS Environmental, Inc.
a subsidiary of
Ogden Water Systems, Inc.

CONTINUOUS CLEANED UPFLOW DUALSAND FILTRATION SYSTEM
DSS SERIES 53000

PROJECT NUMBER:
PROJECT NAME: NYC WATERSHED
DRAWING FILE NUMBER: NYC-53000
SHEET NUMBER: 1 OF 3
REVISIONS:

7600005.02

To Jeff McDonald
802 846-1435

USFilter

MEMCOR, MICROFLOC, GENERAL FILTER PRODUCTS
441 MAIN STREET TELEPHONE 508 347-7344
P.O. BOX 36 FACSIMILE 508 347 7049
STURBRIDGE, MA 01566

April 25, 2000

Technology Sales
Tri-Town Professional Building
6 Wilkins Drive – Suite 209
Plainville, MA 02762

Attention: Michael Caso

Reference: New York City Watershed Project – Watchtower, NY
363,000 gallons per day

Dear Michael:

This letter is in response to your request for budgetary pricing for the Memcor microfiltration system for the 363,000 gpd Watchtower WWTP currently being designed within the New York City Watershed.

The following information is based upon the following design.

Membrane Flux:	**6 gpm / module** **23.3 gfd / module**
Design Flow	363,000 gpd - Peak Flow
Influent Water Quality	Meeting Surface Discharge Limits (with the exception of the Giardia removal)
Per Regulations	Three (3) Sand Filters cells must be supplied; each designed to handle 50% of design flow. Per the DEP, the loading flow rate on all filters shall be a maximum of 3 gpm/ft2.

Peak Flow of 363,000 gpd:
There are actually two ways to attack the microfiltration system. For either system, about 48 modules will be required. The first system would be a 7x6M10C system with seven (7) units, each with 6 modules: six (6) needed to pass the peak flow of 363,000 gpd and the seventh unit to act as the spare. Budget price is $660,000.

The second system could be a 2 x 48M10C system with two (2) units each with 48 modules: one to pass the peak flow and one to act as the spare. Budget price is $627,000.

I have detailed the 2 x 48M10C below. Both systems would work, although there may be some operational advantages seen by the 7x6M10C system due to the variations in the expected flow.

The 48 modules (each with 370 sq ft of surface area) will produce a flux of approximately 20.4 gfd based upon the peak flow of 363,000 gpd. This is below the required flux of 23.3 gfd.

Sand Filters:

Based upon the New York City Regulations currently in issue, the microfiltration system proposed must be preceded by a sand filter. As stated above, for flows more than 50,000 gpd, the NYC Watershed regulations call for three (3) cells of sand filters, each to be sized for 50% of the design flow.

For ease of operation, associated footprint, and capital cost considerations, USFilter recommends the use of the USFilter\DAVCO TES style sand filter. For this flow range, the model required would be the TES 3-5. The TES filters required virtually no operator interface. The water is simply gravity fed through the filter into the clearwell, and pumped onto the CMF unit. The filter is backwashed as required (typically once a day for about 5 minutes).

For your information, I have attached a copy of their layout drawing for a TES 3-7 and catalog cut discussing the TES filters. Although the drawing provided shows a fairly shallow clear well and mudwell, resulting in a fairly large footprint, the design could be easily modified to meet site conditions. One possible scenario would be to supply the filter cells as an integral assembly, but have the clear well and mud constructed on site as concrete tanks. This could allow the wells to be deeper, reducing the overall footprint.

The trial tests performed at the Stamford, NY facility did not involve a sand filter prior to the CMF unit. However, the New York City regulations require a sand filter prior to the microfiltration system. Although USFilter does not feel that there is a technological need for the sand filter prior to the Memcor unit, we will supply a filter in order to be in compliance with the regulations.

The good news is that the sand filter does not cause any operational problems for the CMF units, yet provides additional filtering for the overall plant design. Since the DAVCO TES filters generally do not use any type of chemical addition in tertiary applications, the backwash form the sand filters could easily return to the head of the plant. There would be no additional chemical sludge created from the microfiltration system.

Normally the TES filters designed for this application will backwash once a day (on a timed basis) resulting in a backwash volume equal to approximately 11,600 gallons. This equates to about 2% of design flow. For sizing considerations, one could conservatively use 3.5% of influent flow.

CMF Units:

Based upon the New York City Regulations currently in issue, the microfiltration system proposed must be supplied in order to have a "spare" unit, sized to allow the largest unit to be taken out of service. Under the USFilter design, each CMF microfiltration unit is sized to filter the same flow rate, requiring a single "spare" unit.

The Memcor CMF membrane-filtering system is designed around of a series of CMF skid mounted units, connected to a Backwash Tank, Air Compressor, and a PLC based control system.
At the required flow of 363,000 gpd, a total of two (2) 48M10C units will be required: one (1) unit will be designed to pass the full 363,000 gpd and one (1) unit will be designed as the "spare". The 48M10C units are skid mounted units and are shipped fully wired, piped, and tested.

In addition to meeting the regulations in regards to the "spare" requirement, by designing a process system with multiple units provides the operator flexibility in terms of flow control. As a reference, the Grand Gorge WWTP is designed along these lines with three (3) 72M10C units. Although the individual units are larger, the system at the Grand Gorge facility functions the same way as the

one proposed for this flow rate. Due to the size of the units, the Chemcial Clean-In-Place process is accomplished more automatically and re-uses the chemicals multiple times. In addition, due to the design of the larger membrane systems, the raw water feed pumps are not included as part of the membrane "skid". These raw water pumps are generally located in a wet well location.

Typically the CMF units designed for this application will backwash every 20-30 minutes (on a timed basis) resulting in a backwash volume equating to about 7-10% of design flow. Based on the performance of the primary and secondary treatment, the backwash cycle may be extended, reducing the backwash percentage. The units currently in operation in the watershed have been adjusted to have 45 minutes and 90 minute backwash rates, greatly reducing the volume of backwash returning to the head of the plant.

The CMF system would include the following equipment.

Item	*Number*	*Description*
1.	2 (two) ea.	Supply of Memcor microfiltration units Model 48M10C,comprising of forty-eight M10C membrane modules with nylon centertubes, ABS/Nylon/PE/ 316 S.S. pipework. Keystone Butterfly valves and actuators with S.S. discs, filtrate magnetic flow meter, pressure transmitter, epoxy painted mild steel frame. Allen Bradley SLC 5/03 PLC and software mounted in NEMA-4 stainless steel enclosure. Electrical requirements will comply with NEC and NEMA 4 specifications.
2.	1 (one) ea.	Master Control Panel with Allen Bradley SLC 5/03 PLC and software mounted in NEMA-4 stainless steel enclosure. Electrical requirements will comply with NEC and NEMA 4 specifications.
3.	1 (one) ea.	Backwash energy dissipation tank including FRP tank, drain valve, level transmitter, high and low level switches.
4.	1 (one) set	Backwash Air Supply System, consisting of the following:
	1 (one) ea.	100% rotary screw air compressors with integrated dryer
	1 (one) ea.	100% Process air coalescer and membrane filter assembly.
	1 (one) ea.	Backwash air receiver ASME Code epoxy coated inside and prime painted on the exterior with pressure relief, pressure gauge, auto drain and pressure transducer.
5.	1 (one) ea.	Chemical Clean-In-Place system including: Chemical Storage Tank, electrical controls, isolation valves, and necessary monitoring devices.

All CMF skids are preassembled, pressure tested and stepped through the various functions that they will be asked to perform. Valve/actuator assemblies are shop installed with air supply runs provided between each valve and its respective solenoid mounted in the junction box, which is also mounted on the skid. All onboard instruments are installed, terminated and tested prior to shipment. Nothing leaves the USFilter manufacturing facility without passing an extensive QA checklist. Memcor's design has been in operation successfully for more than ten years.

Budgetary Cost:
The budget price of the 2 x 48M10C CMF microfiltration system is $627,000.

The budget price of the DAVCO TES filter is $85,000.

Items Not Included in Budget:
The cost associated with the installation of the CMF Membrane system has not been included in the budget provided. Due to the ease of the mechanical and electrical installation of the CMF units and the sand filters, the installation phase is generally very quick and straightforward. Typically the installation is conducted by any local general contractor.

Operational & Maintenance:
Due to the ease and automation of a membrane filtering system and the filters, the expected operating costs are estimated at approximately $0.31 per 1000 gallons. This estimated operating cost falls within the expected operating range historically found for a membrane plant of this size. The calculations are based upon our historical data, derived from a wide variety of projects and applications including the five- (5) full-scale CMF systems currently operating in the NYC Watershed.

This budget operating cost for the microfiltration "system" is based upon the following assumptions:

Labor	
Labor Cost	$25. /hr
Labor Time	1.5 hours/day
Service	
Service Trips per year	1
Days on Site per trip	3
Spare Parts	$1,000/year
Other Costs	
Electrical Cost	$.13/KWH

- Influent Feed Pumps
- Recirculation Pumps (during CIP)
- Air Compressors

All Chemical Costs

Membrane Replacement	Cost of replacement membranes is included In the operating cost. (Based on a 7 year membrane Life.)

Operational Advantages of a Memcor CMF system:
There are several key advantages to the USFilter\Memcor CMF filtration system. The first key advantage is the physical barrier provided by the membranes. The Memcor unit is designed with membranes with .2 micron pores, removing all particles larger than .2 micron. The key items removed are Giardia and Cryptosporidium.

The physical barrier also translates to a filtration system that is able to handle very low turbidities as well as very high turbidities (400 NTU). Due to the design and operation of a membrane, a variability of the raw water influent quality and turbidity does not adversely affect the operation of

the unit. For example, during an upstream "burp", the microfiltration system could experience a high turbidity spike. The Memcor CMF unit will easily handle such a condition with minimal adjustments. For a prolonged spike, the CMF system may see slightly more frequent backwashes, but once the spike subsides, the backwash cycle will return to normal. Due to the physical barrier provided by the membrane system, throughout the spike condition, the effluent water quality will not be affected.

In order to ensure the proper operation of the physical barrier, Memcor has incorporated an in-situ test in all the CMF systems, which verifies the integrity of the entire filtering system. Under this test, one is ensured that the system is removing a minimum of 3 log of particles larger than .2 micron. This test is typically performed once a day, but can be performed more frequently is desired.

Another key advantage of the Memcor CMF units is the extremely large data and experience base. For more than 10 years, Memcor has provided the *same design* membrane system to over 700 sites worldwide. We currently have over 140 sites (with more than 20,000 modules) in operation in the US alone.

Good luck with your review and I look forward to hearing from you.

Sincerely,
USFilter

S. Moseley

Simon C. Moseley, P.E.
Technical Sales Manager

CC: Chris Burde – Burde Inc.
Dan Crawford – Aftek, Inc.

Attachments: Layout drawings for 2 x 48M10C

USFilter

MEMCOR, MICROFLOC, GENERAL FILTER PRODUCTS
441 MAIN STREET
P.O. BOX 36
STURBRIDGE, MA 01566
TELEPHONE 508-347-73
FACSIMILE 508-347 70

April 17, 2000

Operating Costs

One topic that is required to be carefully scrutinized for the NYC Watershed projects is the anticipated Operations & Maintenance costs associated with both types of microfiltration technology approved for use by the NYC-DEP.

USFilter\Memcor Products has a unique opportunity to evaluate both its large historical database of similar installations and the five (5) full-scale treatment plants currently operated by the NYC-DEP within the watershed at Grand Gorge, Tannersville, Pine Hill, Margarettsville, and Grahamsville. The O&M information detailed below and on the accompanying spreadsheet is based on *real* full-scale operating data.

Although no full-scale, long term operating data is available for the CBUD process, in an attempt to make the comparison as fair as possible and allow an "apples to apples" analysis between various technologies and processes I have created the attached O&M Cost spreadsheet. The spreadsheet assumes a full-flow condition, 365 days per year and is also based upon results derived in part from the Stamford trial tests.

Membrane Systems:

In terms of the membrane system, the operating costs have also been compared to the historical data accumulated from over 700 microfiltration systems operating around the world. Over the past 10 years, we have been able to fairly accurately calculate the anticipated O&M costs.

CBUD Up-Flow Sand Filters:

Every attempt has been made to portray the anticipated O&M costs expected to be seen with the CBUD process. With no full-scale installations on wastewater treatment plants, the O&M costs have been based upon "typical" sand filtration processes and from the Stamford trial report.

Key O&M factors:

The following are key factors contributing to the "true" operating cost of any system:

- Labor – associated with the daily routine checking and monitoring of the system
- Power – associated with the electrical power required operating the raw water pump(s), the air compressor, and the chemical clean heater.
- Chemical Costs – associated with all chemicals required to operate the system
- Membrane replacement cost – based on proven replacement frequency
- Spare Parts – associated with routine annual maintenance
- Media Replacement
- Annual Field Service - to perform annual field check-ups of system

Portions of these key factors will be spent each year in order to properly operate any microfiltration system. Depending upon the process or technology, each factor will be weighted differently. For example, a chemical based system will consume a much higher cost of chemicals than a membrane system, or a cross flow membrane system will require significantly higher energy costs than a direct flow membrane system.

I have listed out the parameters used in the calculation of the O&M costs. For each parameter, I have included a brief explanation of how each parameter is calculated in the spreadsheet.

Labor:

For the spreadsheet provided, we have used $25.00 per hour for labor.

Membrane System:

From our experiences within the Watershed and at our other full-scale systems, the anticipated time required to inspect, monitor, and operate the microfiltration systems will range from 45 minutes to 2 hours per day depending upon the size of the system and the number of units in operation.

This time would be used to do a "walk-through" to verify the proper operation of the units as well as a daily log of the monitored parameters.

Being the single, largest factor of the O&M costs, the determination of the "real" labor costs associated with each system needs to be carefully considered. USFilter has tried to give realistic times that are spent associated with normal operation of the microfiltration system.

CBUD system:

With no full-scale installations on wastewater treatment plants, the O&M costs have been based upon "typical" sand filtration processes which rely on chemical addition. Due to the nature of chemical addition, one could argue that the required attention could be more than the membrane system since it is critical that the chemical addition is correct dosage in order to obtain the required 3-log removal. To avoid potential disagreement, the spreadsheet utilizes the same labor as the membrane system.

Power:

For the spreadsheet provided, we have used $0.13 per kilowatt-hour (kWh).

The power included for the O&M costs for the microfiltration system is based upon all power required to operate the raw water pumps, the air compressors, and the controls.

Memcor System

For the Memcor membrane system, there are four contributors for power consumption: raw water pump, air compressor, filter backwash pump, and the electrical control panels.

Raw water pump: For the Memcor membrane system, the raw water pump has multiple operating schemes: normal filtration (clean and dirty), backwash sweep, and Clean-In-Place (CIP). The attached drawing (PUMP-1) is intended to help illustrate the normal mode of operation of the raw water pump.

Normal Filtration – Clean (Point A): At this point, the pump will be required to develop sufficient flow and pressure to overcome the differential transmembrane pressure (TMP) caused by the clean membranes. Combined with pipe losses and TMP, the operating pressure will be about 10 psi.

Backwash Sweep (Point B): During normal filtration, the membrane system is designed to have periodic backwashes (i.e. every 25 minutes). During a 2 minute backwash, the raw water pump is utilized to provide a high flow, medium pressure raw water sweep for 40 seconds.

Normal Filtration – Dirty (Point C): As the membranes become "fouled" over time (i.e. 21 days), the TMP increases and the resulting load on the pump/motor increases. The maximum operating pressure would be about 30 psi.

Clean-In- Place (Point D): When the membranes are required to be chemically cleaned, the raw water pump circulates the chemicals through the membrane system for a period of 2 hours.

To assist the review of the power consumption of the raw water pump for the membrane system, the individual power factors have been broken out on the spreadsheet. Please note that the raw water pump will not operate at full nameplate loading during normal operation.

Air Compressor: The air compressor is used on the membrane system only during the backwash Cycle. For this reason an air receiver tank is supplied, the air compressor only Operates a small fraction of the normal operation time. This spreadsheet assumes the Compressor motor will be operating 20% of the time.

Filter Backwash Pump: The filter backwash pump will be operated about 15 minutes per day.

Control Panels: The spreadsheet is assuming that the controls for both technologies are very Similar in terms of power consumption. Three (3) Amps at 120 VAC has been selected as a reasonable value.

CBUD System:

For the CBUD system, there are four contributors for power consumption: raw water pump, air blower, and the electrical control panels.

Raw Water Pump: The spreadsheet assumes 100% flow is required to be delivered approximately 20 feet in elevation. This flow is continuous.

Air Blower: The air blower (low-pressure air) for the CBUD system requires the blower to be operated continuously. Without an air receiver tank, the CBUD air blower will operate 100% of the time.

Control Panels: The spreadsheet is assuming that the controls for both technologies are very similar in terms of power consumption. Three (3) Amps at 120 VAC has been selected as a reasonable value.

Chemical Costs:

For both technologies chemicals are required. For all chemicals, the costs are typical quantities shipped to the job site.

Memcor System

The Memcor microfiltration system requires only a very small amount of chemicals during the chemical cleans. The Clean-In-Place chemical cleans are anticipated to occur about every 21 days. The cost of the chemical utilized, Memclean, is $10.00 per gallon.

CBUD System

The CBUD system is a chemical-based process, utilizing chlorine and coagulant.

The largest operating cost is associated with the PASS coagulant. The PASS coagulant is the required chemical treatment based upon the trial studies at Stamford WWTP. Per the NYC-DEP Protocol for testing Equivalency of Continuous Backwash, Upflow Dual Sand Filter with Microfiltration (Page A-23), the required PASS dosage is typically 3 gallons per day for a 49,000 gpd facility. The spreadsheet calculates the PASS requirement based upon the concentration tested.

Spare Parts:

The spreadsheet assumes $1,000 of spares parts per year. This does not include media replacement, membrane replacement, or air line replacement.

Membrane Replacement:

The O&M costs include the cost of the membrane replacements based on a 7-year replacement schedule. The cost of the membrane replacements is based upon a cost of $750/membrane module.

In-Line Air Replacement:

The O&M costs include the cost of the air-line replacement based on a 5-year replacement schedule. The cost of the air-line replacements is based upon a cost of $2,000/air-line.

Media Replacement:

With any sand filter based system, there will be a need to replace the media. To allow the spreadsheet to be useful for all flows, the media replacement has been tied to the daily flow of the facility. In this way, there is a rough estimate included in the O&M costs seen by both technologies for media loss/replacement.

Membrane System:

Due to the nature of the gravity sand filter, the quantity of media, the infrequent backwashes, and the anticipated operation, the spreadsheet calculates replacement media as 10% of flow

CBUD System:

Due to the nature of the up-flow sand filter, the quantity of media, the continuous backwashing, and the anticipated operation, spreadsheet calculates replacement media as 20% of flow

Manufacturer's Annual Service:

Although not required for our systems, typically owners will have a field service technician spend 2-3 mandays on site each year to perform a preventative maintenance check and inspection. The spreadsheet includes the same cost for both technologies: 3 days on-site per year.

If you have any questions regarding the calculated O&M costs, please feel free to give me a call @ 508-347-4532.

Simon C. Moseley, P.E.
USFilter – Memcor Products
Sturbridge, MA 01566

Microfiltration Anticipated O&M Costs

165,000 gpd Design 3/27/00 15:30

Membrane System **Annual Cost**

5 6 M10C Units
24 Total Design Modules
30 Actual Modules

ITEM	Costs Based			Qty			Yearly Cost	
Labor								
Labor to monitor do "walk-through"	$ 25.00	per hour		8	hrs/week		$ 10,400.00	per year
Labor to perform required duties such as chemical cleans, maintain chemical dosing systems, proventive maintenance, and cleaning monitoring control devices.								
Power								
Raw Pump	$ 0.13	per kwhr	100 % Operation	11952	kwhr/year		$ 1,553.76	per year
Assume that the system will be operating at 100% of the design flow 365 days/year.								
The pump and motor are sized to provide the required flow/pressure requirements								
* Normal Filtration: Operating pressure of 7 psi at 8 gpm/module after CIP								
* Normal Filtration: Operating pressure of 20 psi at 6 gpm/module just prior to CIP								
* Backwash: 17.6 gpm/module at 10 psi for 40 seconds								
* Backwash: Pump OFF for 80 seconds			25 min B/W					
Air Compressor	$ 0.13	per kwhr	20 % Operation	3926	kwhr/year	3	$ 510.38	per year
Blower	$ 0.13	per kwhr	100 % Operation		N/A			
Filter B/W Pump	$ 0.13	per kwhr	15 min per day	341	kwhr/year	5	$ 44.33	per year
Control Panels (based on 5 Amps @ 120 VAC)	$ 0.13	per kwhr		5256	kwhr/year		$ 683.28	per year
Chemicals (all)								
CIP Clean for Membrane Systems (based on 14 day cleans at Trial)	$ 10.00	per gallon (Memclean) 14 day CIP interval	26 CIPs / year / unit 104 CIPs / year	416	gal/year		$ 4,160.00	per year
Chlorine (if required)	$ 0.20	per pound			N/A			
Coagulant (PASS for DSS system) (based on 3 gallons per 49,000 gpd at Trial)	$ 4.40	per gallon of PASS (shipping included)			N/A			
NaCl (based on .1mg/L at Trial)	$ 0.12	per gallon			N/A			
Spare Parts								
"Normal" Spare Parts Anticipated				1000	per year		$ 1,000.00	per year
Membrane Replacements (based upon 7 year replacement term)	$ 750.00	per module		4.3	per year		$ 3,225.00	per year
Inner Air Line Replacement (based on replacement every 5 years)	$ 2,000.00	per filter			N/A			
Media Replacement	$ 0.20	per pound		825	lbs per year		$ 165.00	per year
Manufacture's Service								
Service to perform annual check-out (additional training, preventive maintenance - price includes expected travel)	$ 1,100.00	per day		3	days / year		$ 3,300.00	per year
						Total	$ 25,041.75	per year
							$ 0.42 per 1000 gallons	

Notes:
PASS based on pilot report (page A-23). ["typically three (3) gallons per day of PASS and a total chlorine residual of .5 ppm"]

Post-it® Fax Note 7671 | Date | # of pages ▶ 2
To Norton True | From Jeff McDonald
Co./Dept. | Co.
Phone # | Phone #
Fax # | Fax #

Chemical -Based Equivalence*

Annual Cost

3 Cell Dual Upflow Filter

Qty				Yearly Cost	
8	hrs/week		$	10,400.00	per year
10274	kwhr/year		$	1,335.62	per year
	N/A				
13087	kwhr/year	2	$	1,701.31	per year
	N/A				
5256	kwhr/year		$	683.28	per year
	N/A				
3011.3	gal/year		$	602.26	per year
3668	gal/year		$	16,139.20	per year
300	gal/year		$	36.00	per year
1000	per year		$	1,000.00	per year
	N/A				
0.6	per year		$	1,200.00	per year
3300	lbs per year		$	660.00	per year
3	days / year		$	3,300.00	per year
		Total	$	37,057.67	per year
			$	0.62	per 1000 gallons

B/W per CIP
806.4

HP, flow, pressure per sequence per unit.

	(clean)	(dirty)	(b/w)	(CIP)
	psi	psi	psi	psi
	10	25	25	25
Flow gpm	HP (clean)	HP (dirty)	HP 'backwash'	HP (CIP)
36	0.247083			
36		0.62		
105.6			1.81	
105.6				1.81
	kwh/CIP	kwh/CIP	kwh/CIP	kwh/CIP
	57.05	43.06	12.11	2.7

Total Kwh/CIP per unit
114.92

Total kwh/year per unit
2987.92

Total kwh/year/system
11952

HP for Upflow Filter

Flow gpm	Ft (elevation)	HP	
114.58	20	1.57	Total kwh/year/system 10274

ASHBROOK CORPORATION ID:2819854431 MAY 23'00 6:25 No.001 P.01

→ Jeff → Phil → File

FAX TRANSMITTAL

DATE: May 23, 2000

FROM: Michael Combs

TO: Jeff McDonald

COMPANY: Dufresne Henry

FAX #: (914) 855-1780

SUBJECT: Watch-Tower Filters

 # OF PAGES INCLUDING THIS PAGE: 12

Hydro-Aerobics™
11600 East Hardy
Houston, Texas 77093
Phone: (281) 449-0322
Fax: (281) 985-4431
Email: mcombs@ashbrookcorp.com

Jeff,

Please find attached revised proposal per our telephone conversation yesterday morning, along with the drawing of the system as requested.

Should you have any further questions or need any additional information, please do not hesitate to call.

Sincerely
Ashbrook Corporation

Michael Combs
Project Manager

CC: Dennis Geran / F.R. Mahony & Associates (781) 982-1056

H:\Hydro\Engineering & Sales\Work Sheets\FAXSHEET.DOC

May 9, 2000

Equipment Proposal

To: Dufresne Henry Consulting Engineers

Attn: Jeff McDonald

Project: New York Project

Quote No.: 2005-5599R1

Hydro-Aerobics™
11600 East Hardy
Houston, Texas 77093-1098
Phone: (281) 449-0322
Fax: (281) 985-4431
Email: hai@ashbrookcorp.com

We are pleased to propose the wastewater treatment equipment for the New York project. This proposal has been prepared based on request for quotation dated May 8, 2000. The following is a listing of the equipment we are proposing to supply. This proposal has not been published and is the sole property of Ashbrook Corporation, it is lent to the borrower for his confidential use only. In consideration of this loan, the borrower promises to return it upon request and agrees that it shall not be reproduced, copied, lent, or otherwise disposed of, directly or indirectly, nor used for any purpose other than that for which it is specifically furnished.

TERTIARY FILTER SYSTEM

We are pleased to propose three (3) Hydro-Aerobics™ model HF-181 prefabricated steel tertiary filter as manufactured by Ashbrook Corporation, Houston, Texas. The tertiary filter system shall be of the rapid sand type and will have a design flow of 181,500 each for a total of 363,000 gallons per day of treated secondary effluent, and will include all of the necessary vessels, internal piping, weirs, baffles, and items of equipment as indicated below:

Filter Equipment

One (1)	Flow inlet chamber
Two (2)	21 ft^2 Filter Cells
One (1)	3,781 gallon Clearwell Chamber
Two (2)	Backwash Pumps, Goulds model 3887, powered by 3/4 hp, 230 volt, 60 Hz, 3 phase motors, rated at 63 GPM @ 17' TDH
One (1)	3,970 gallon Mudwell chamber
Two (2)	Mudwell Return Pumps, Goulds model 3887, powered by 1/2 hp, 230 volt, 60 Hz, 3 phase motors, rated at 127 GPM @ 15' TDH
Two (2)	Air Scour Blower motor unit, Hydro-Aerobics™ model BM-85-R24-4, with capacity of 85 SCFM at 4 PSIG, powered by a 2 hp, 230 volt, 60 Hz, 3 phase ODP motor, mounted on a fiberglass base with inlet filter/silencer
One (1)	Pressure Relief Valve and Pressure Gage, mounted in air manifold
One (1)	Tertiary Control Panel mounted in NEMA 3R enclosure with necessary magnetic starters, circuit breakers, programmable timers, selector switches, etc.
One (1)	Lot of filter sand, shipped loose in 100 lb. bags, 10" depth

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May 9, 2000

One (1) Lot of filter anthracite, shipped loose in 50 lb. bags, 20" Depth
One (1) Lot of filter garnet, shipped loose in 50 lb. bags, 2" depth

Corrosion Prevention

Four (4) Magnesium Anodes, 17 lbs. each
One (1) Interior surface sandblast SSSP-SP10, near white
One (1) Exterior surface sandblast SSSP-SP6, commercial blast
One (1) Coat of surface protection, Tnemec 46H-413 Coal Tar Epoxy, 8-10 mils TDFT

Service Walkway

One (1) Lot of grating to cover all tank openings, 18 gauge galvanized, non-skid

Manufacturer's Services

One (1) Trip consisting of three (3) eight-hour days of startup service by an Ashbrook Corporation Service Technician to instruct the owner's personnel in proper startup, operation and maintenance of the system.

General Notes

1) Excavation, foundation pad, crane off-loading, field welding, touch-up paint, plumbing to the plant, connection of anodes, installation of grating and component equipment, electrical wiring, and filling of the tank for testing are to be done by the general contractor.
2) There is no provision included in this quoted price, unless noted, for field erection supervision, tests, inspections or adjustments of equipment. If factory representative is required for any of these services, please refer to "Service Terms" enclosed. The equipment offered by Ashbrook Corporation is our standard design, materials and manufacture. In the event that these items of equipment are subject to any alteration in design or materials or manufacture by the contractor, owner, owner's agent or engineer, such alterations shall be subject to change in the contract price and/or delivery schedule.
3) Each Tertiary will measure 18' long x 12' wide x 11' tall, and will weigh approximately 32,000 lbs. empty.
4) System was quoted for below grade application.

SUMMARY
Price, F.O.B. factory, with freight allowed to Albany, New York,
Off loading to be by others **$196,305.00**

Ashbrook Quote No.: 2005-5599R1
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Taxes:

The quoted price does not include any local, state or federal taxes, permits or other fees. Any taxes or fees that may apply must be added to the quoted price and paid by the buyer.

Note: Ashbrook is only registered to collect and remit sales tax in the following states, Texas, Louisiana, Florida, California and North Carolina. Taxable projects located in states outside these will need to accrue and pay these taxes direct to said state.

Proposal Acceptance:

This proposal is offered for acceptance within sixty (60) days from date of this quotation or date of bid opening, whichever is the later date. Prices are subject to review thereafter. Prices are firm, based upon receipt of a Letter of Intent or Purchase Order and notice to proceed within this sixty (60) day period and the review and for return of submittal drawings to Ashbrook within thirty (30) days. Delays caused by slow return of submittals or other manufacturing delays caused by the contractor, owner, owner's agent or engineer may result in additional charges of 1% per month for such delays or part thereof.

Submittal Drawings:

Submittal drawings on the preceding equipment will be submitted within four (4) to six (6) weeks after receipt of a firm purchase order.

Note: A purchase order signed by both Ashbrook and the purchase order originator must be executed prior to any submittal being forwarded.

Shipment:

Shipment on the preceding equipment can be made within ten (10) to twelve (12) weeks from receipt of approved submittals, and may increase or decrease with volume production at the time of receipt of this required information.

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May 9, 2000

For pricing and information pertaining to the equipment contained in this proposal, please contact our local sales representative:

FR Mahony & Associates, Inc.
273 Weymouth Street
Rockland, Massachusetts 02370

Contact: Dennis Geran
Tel: (781) 982-9300
Fax: (781) 982-1056

Submitted By:

Michael Combs

Michael Combs

ASHBROOK CORPORATION

May 23, 2000

Accepted By:

Purchaser Authorized Signature

Company

Date

Attachment: Terms of Quotation

Ashbrook Quote No.: 2005-5599R1
May 9, 2000

STANDARD TERMS AND CONDITIONS

Standard Terms and Conditions shall apply and form part of the within quotation except as expressly otherwise agreed by an officer of Ashbrook Corporation.

ACCEPTANCE: Unless otherwise expressly stated herein, this quotation shall expire thirty (30) days after its date.

DELIVERY: Except as otherwise specified in this quotation, delivery will be Ex-Works, Houston, Texas. Time of Delivery is an estimate only and is based upon the receipt of all information and necessary approvals. The company shall in no event be liable for delays caused by fires, acts of God, strikes, labor difficulties, acts of governmental or military authorities, delays in transportation or procuring materials, or causes of any kind beyond the company's control.

WARRANTIES: The equipment offered is warranted in accordance with the terms of Ashbrook's standard warranty which is hereby made part of this proposal.

PRICES: All prices exclude sales, use, occupation, license, excise and other taxes in respect to manufacture, sale or delivery, all of which shall be paid by the buyer unless a proper exemption certificate is furnished.

TERMS OF PAYMENT: Fifteen percent (15%) down payment required with order, fifteen percent (15%) due upon customer's approval of engineering submittal, balance net cash within thirty (30) days after date of invoice or at start-up, whichever occurs first, subject to the approval by SELLER'S Credit Department. Interest in the amount of one and one-half percent (1-1/2%) per month will be added to all invoices not paid within thirty (30) days of the date of the invoice.

CANCELLATION CHARGES: In the event the buyer elects to cancel the order or if any proceeding be instituted by or against buyer under any bankruptcy or insolvency law, or if in Ashbrook's judgment, buyer's financial situation justifies such action, Ashbrook may, at it's election exercisable at any time prior to delivery require payment in advance or cancel the order as to any unshipped items and require payment of it's reasonable cancellation charges.

Schedule of Cancellation Charges

Attained Milestone	% of P.O Contract Value
Prior to Submittal	5%
Subsequent to Submittal Approval	15%
Subsequent to Release to Production	50%
Subsequent to Initiation of Equipment Assembly	100%

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May 9, 2000

BACKCHARGE (S)/CHANGE ORDER (S): Ashbrook shall not accept any backcharges unless written approval has been furnished by an authorized Ashbrook employee prior to work/task commencement. All change orders must be executed by an authorized Ashbrook employee prior to commencement.

TITLE AND LIEN RIGHTS: The equipment shall remain personal property, regardless of how affixed to any realty or structure until the price (including any notes given therefore) of the equipment has been fully paid in cash, the company shall, in the event of customer's default, have the right to repossess such equipment.

THIS QUOTATION MAY BE CHANGED OR BE REVOKED AND WITHDRAWN BY THE COMPANY AT ANY TIME UPON WRITTEN NOTICE TO THE BUYER.

Ashbrook Quote No.: 2005-5599R1
May 9, 2000

Service Terms

1. Rates

Service rates are as follows per 8-hour man-day during normal working hours:

	Monday-Friday	Saturday	Sunday & Holidays
Service Technicians	$750/day	$1,125/day	$1,500/day
Process Technicians	$950/day	$1,425/day	$1,900/day
Process Engineers	$1,500/day	$2,250/day	$3,000/day

Overtime service rates on an hourly basis in excess of 8 hours worked are as follows:

	Monday-Friday	Saturday	Sunday & Holidays
Service Technicians	$140.63/hr	$140.63/hr	$187.50/hr
Process Technicians	$178.12/hr	$178.12/hr	$237.50/hr
Process Engineers	$281.25/hr	$281.25/hr	$375.00/hr

All above rates are in U.S. dollars. Travel time is included as working time. Parts and expenses are additional. Terms - 2% ten (10), net 30 days.

2. Minimum Billing

A minimum charge of 1/2 day's time will be made. Billing will be made in 1/2-day increments for time each day at job and/or traveling during normal working hours. Thus, five hours spent on job and/or traveling is billed as one full day.

3. Normal Working Time

Eight hours per day with one hour for lunch, Monday - Friday, except observed holidays.

4. Travel

All travel expenses incurred by the Ashbrook service Representative are chargeable.
These Include:

- Plane, Train and/or Automobile rental cost from Ashbrook, Houston, Texas, to the customer's plant or construction site and return.
- Private Automobile travel at the rate of 32.5 cents/mile.
- Expenses also include all local travel.
- Living expenses for lodging, meals and incidental costs.
- Telephone calls and wires, as required in connection with the details of the job.
- When our service representative goes from job to job rather than returning to his headquarters, an equitable distribution or travel charge will be made.

A 20% charge will be added to cover administration costs on all travel and living expenses.

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5. **Parts**
All parts supplied will be billed at selling prices. Service work by others under our authorization will be billed at our cost plus 20% overhead.

6. **Limits of Liability**
As our representatives are authorized to work on Ashbrook equipment, all responsibility for operation rests with the customer. Ashbrook shall not be liable for any claims, losses, labor, expenses, or damages, direct or consequential, resulting directly or indirectly from the service performed hereunder or for other consequential loss or damage of any nature arising from any cause.

7. **Authorization**
Ashbrook will not commence any service work until an official Purchase Order for the work has been received.

Ashbrook Quote No.: 2005-5599R1
May 9, 2000

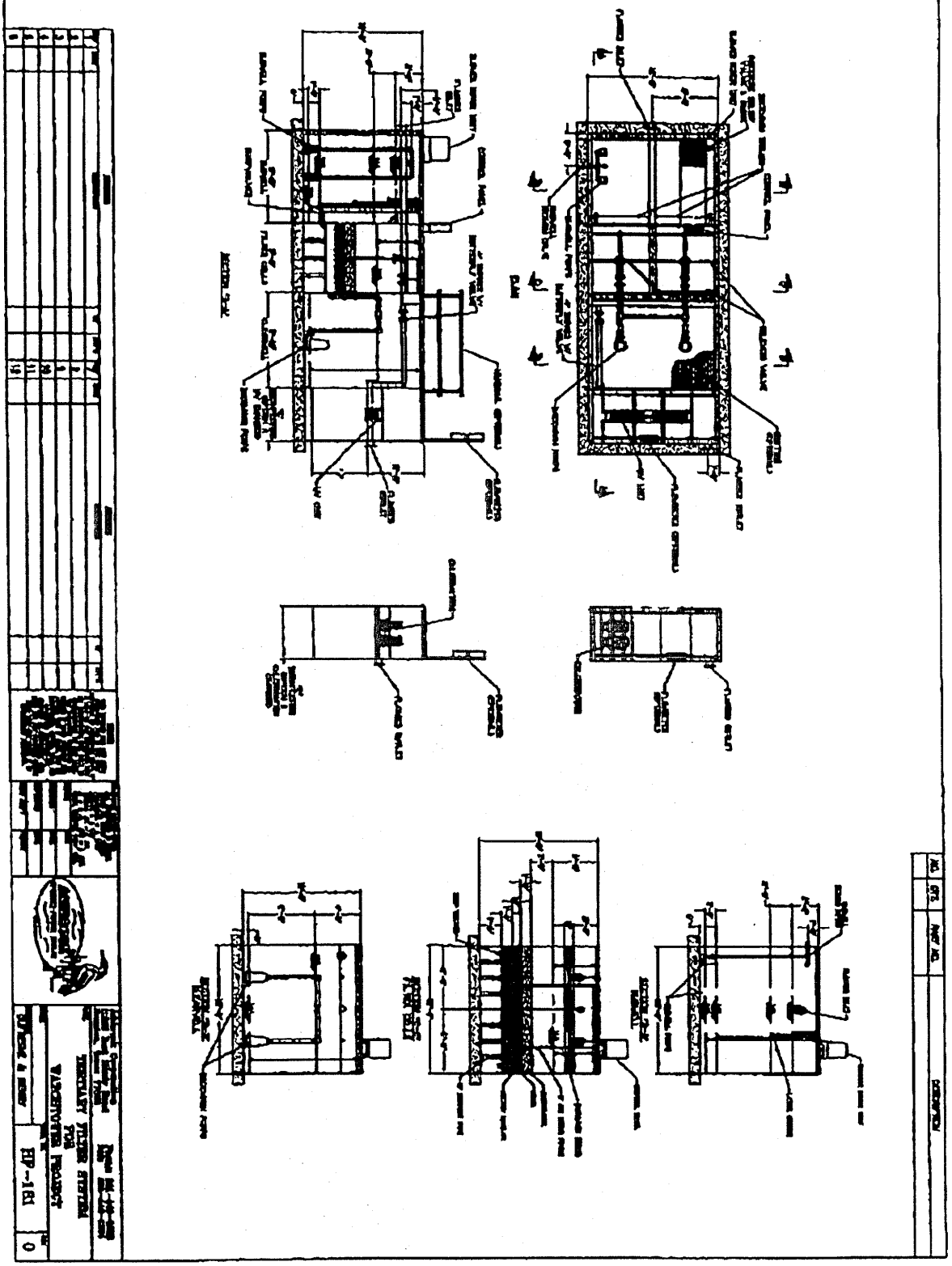
WARRANTY

ASHBROOK CORPORATION warrants for a period of twelve (12) months from start up, not to exceed eighteen (18) months from date of shipment, the new equipment of its own manufacture to be free from defects in material and workmanship under normal use and service when used and maintained in accordance with instructions supplied by Ashbrook. Ashbrook's obligation under this warranty being limited to repairing or replacing, at its option, any part found to its satisfaction to be defective, providing that such part is, upon request, returned to Ashbrook's factory, freight prepaid. This warranty does not cover parts damaged by decomposition from chemical action or wear caused by abrasive materials, nor does it cover damage resulting from misuse, accident, neglect or from improper operation, maintenance, installation, modification, or adjustment. This warranty does not cover parts acquired outside of Ashbrook's factory without prior written approval. Ashbrook makes no warranty as to starting equipment or other materials not of its manufacture, since the same are covered by warranties of the respective manufacture thereof.

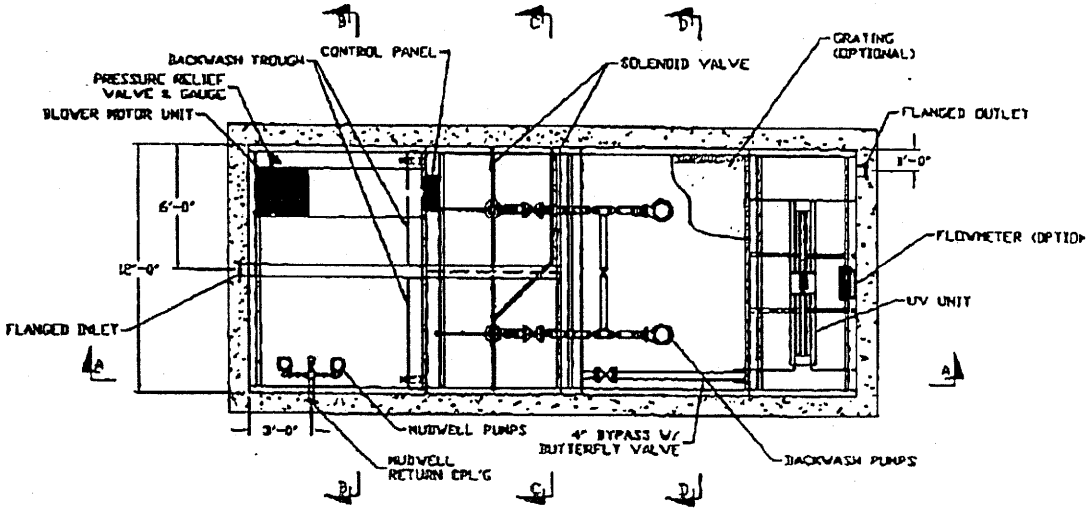
Ashbrook shall not be liable for indirect or consequential damages, whether or not caused by seller's neglect. Consequential damages for the purposes of this agreement shall include, but not be limited to, loss of use, income or profit, or loss of or damage to property occasioned by or arising out of the operation, use, installation, repair or replacement of the equipment or otherwise.

"Start up" for the purpose of this agreement shall be the date when the equipment is first placed into operation regardless of the status of other items, i.e. items not listed on proposal #2005-5599R1.

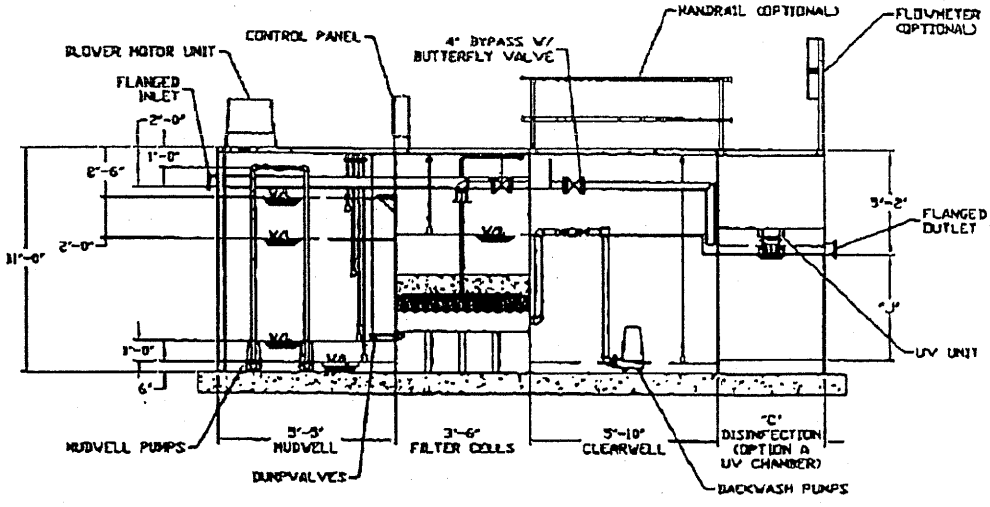
All parts repaired or replaced under this warranty will continue coverage on a pro rated basis of the original warranty.



B4KATRJDWG REV. 3



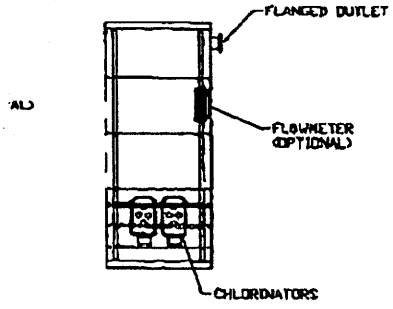
PLAN

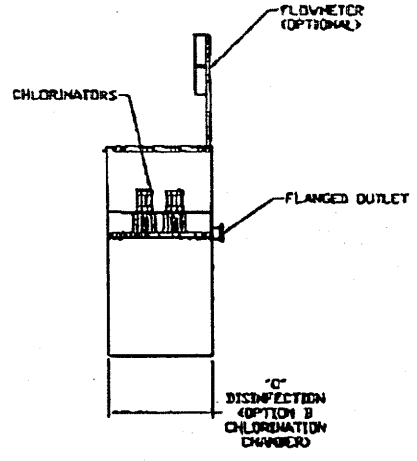


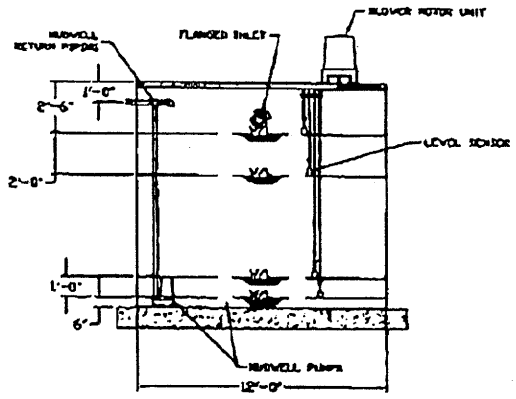
SECTION "A-A"

REV	DATE	DESCRIPTION	BY	APP'D	REV	DATE	DESCRIPTION
1					7		
2					8		
3					9		
4					10		
5					11		
6					12		

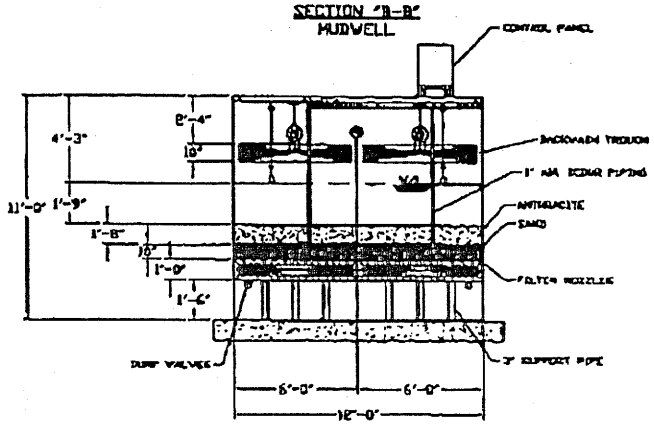
NO.	QTY.	PART NO.	DESCRIPTION



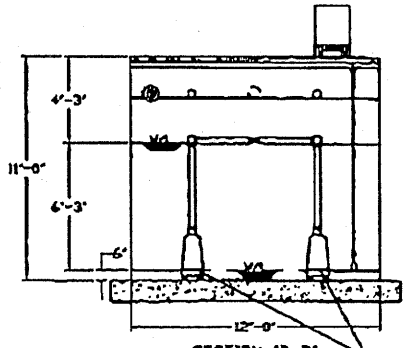




SECTION "B-B"
MUDWELL



SECTION "C-C"
FILTER CELLS



SECTION "D-D"
CLEARWELL

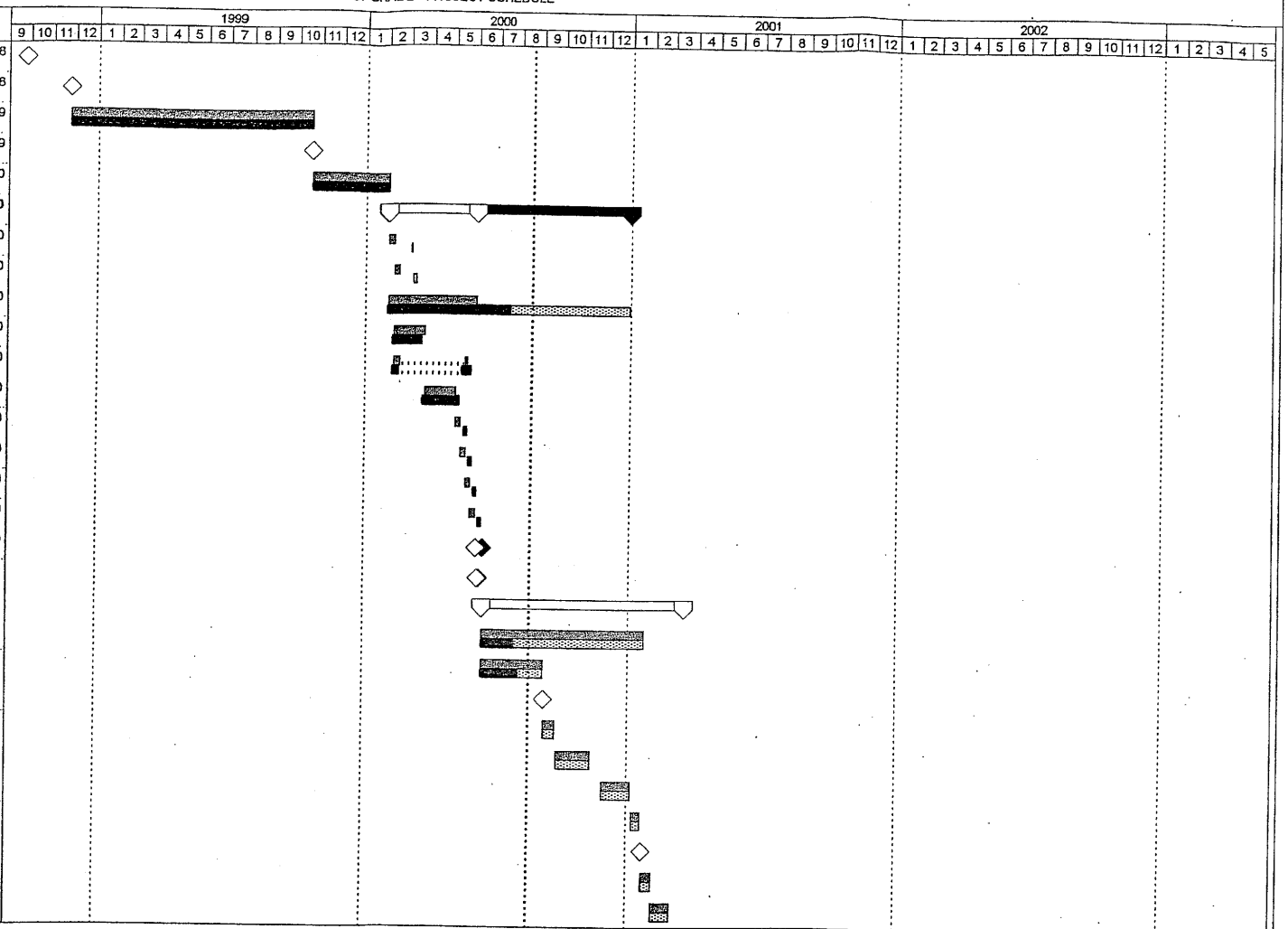
	BY	APP'D	NOTICE: THIS DRAWING AND NOT BEEN PUBLISHED AND IS THE SOLE PROPERTY OF ASHBROOK CORP. IT IS LOAN TO THE BORROWER FOR HIS CONSIDERATION, LOAN ONLY, IN CONSIDERATION OF THIS LOAN, THE BORROWER PROMISES TO RETURN IT UPON REQUEST AND AGREES THAT IT SHALL NOT BE REPRODUCED, COPIED, LOAN, OR OTHERWISE DISPOSED OF, DIRECTLY OR INDIRECTLY, NOR USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SPECIFICALLY FURNISHED.	TOLERANCE UNLESS NOTED: ALL DIMENSIONS IN INCHES. FRACTIONS ± 1/64 ANGLES ± 1/2° DECIMAL .XX = ± .03 .X = ± .1 .XXX = ± .010 MACH. SURFACE "ECM" MAX.	Ashbrook Corporation 11600 East Hardy Road Houston, Texas 77093 Phone: 281-449-0322 FAX: 281-449-1324
			DRAWN DATE		TITLE: TERTIARY FILTER SYSTEM FOR WATCHTOWER PROJECT
			CHECKED DATE		
			APPROVED DATE		SCALE:
			PLANT ACCT. ACCOUNT		CUSTOMER: DUFRESNE & HENRY
					DWG. NO.: HF-181
					REV: 0

Appendix F

Project Schedule

WATCHTOWER WWTP UPGRADE - PROJECT SCHEDULE

ID	Task Name	Start	Finish
1	M1 Distribute RFP	Fri 9/25/98	Fri 9/25/98
2	M2 Submit Engineers Proposals	Tue 11/24/98	Tue 11/24/98
3	NYCDEP/EFC Approval	Tue 11/24/98	Mon 10/18/99
4	M3 Submit Engineer Contract to EFC	Mon 10/18/99	Mon 10/18/99
5	NYCDEP/EFC Approval	Tue 10/19/99	Tue 2/1/00
6	**2.1 Study and Report Phase**	**Tue 2/1/00**	**Sun 12/31/00**
7	2.1.1 Project Initiation Meeting "START"	Fri 3/3/00	Fri 3/3/00
8	2.1.2 Special Services/SEQRA	Mon 3/6/00	Fri 3/10/00
9	2.1.3 Regulatory Interaction	Tue 2/1/00	Sun 12/31/00
10	2.1.4 Alternative Project Approaches	Tue 2/8/00	Fri 3/17/00
11	2.1.5 Project Compliance Schedule	Tue 2/8/00	Wed 5/24/00
12	2.1.6 Conceptual Upgrade Plan (CUP)	Mon 3/20/00	Mon 5/8/00
13	2.1.7 CUP Regulatory Approval	Mon 5/15/00	Fri 5/19/00
14	2.1.8 Revise CUP	Mon 5/22/00	Fri 5/26/00
15	2.1.9 Resubmit CUP	Mon 5/29/00	Fri 6/2/00
16	2.1.10 CUP Acceptance	Mon 6/5/00	Fri 6/9/00
17	M4 Submit Approvable CUP	Mon 6/12/00	Mon 6/12/00
18	Regulatory Approval Confirmation	Wed 6/7/00	Wed 6/7/00
19	**2.2 Preliminary Design Phase**	**Mon 6/12/00**	**Mon 3/19/01**
20	2.2.1 Proposed Upgrade Plan (PUP)	Mon 6/12/00	Mon 1/22/01
21	2.2.2 Facility Plan Development	Mon 6/12/00	Tue 9/5/00
22	M5 Submit Approvable Facility Plan	Thu 9/7/00	Thu 9/7/00
23	NYCDEP/EFC Approval	Thu 9/7/00	Fri 9/22/00
24	2.2.3 Mid Design to 65%	Mon 9/25/00	Fri 11/10/00
25	2.2.4 Detailed Design Submittals	Mon 11/27/00	Fri 1/5/01
26	2.2.5 PUP Review Revisions	Mon 1/8/01	Fri 1/19/01
27	M6 Submit Approvable PUP	Mon 1/22/01	Mon 1/22/01
28	NYCDEP/EFC Approval	Mon 1/22/01	Mon 2/5/01
29	2.2.6 Final Upgrade Plan (FUP)	Mon 2/5/01	Mon 3/5/01

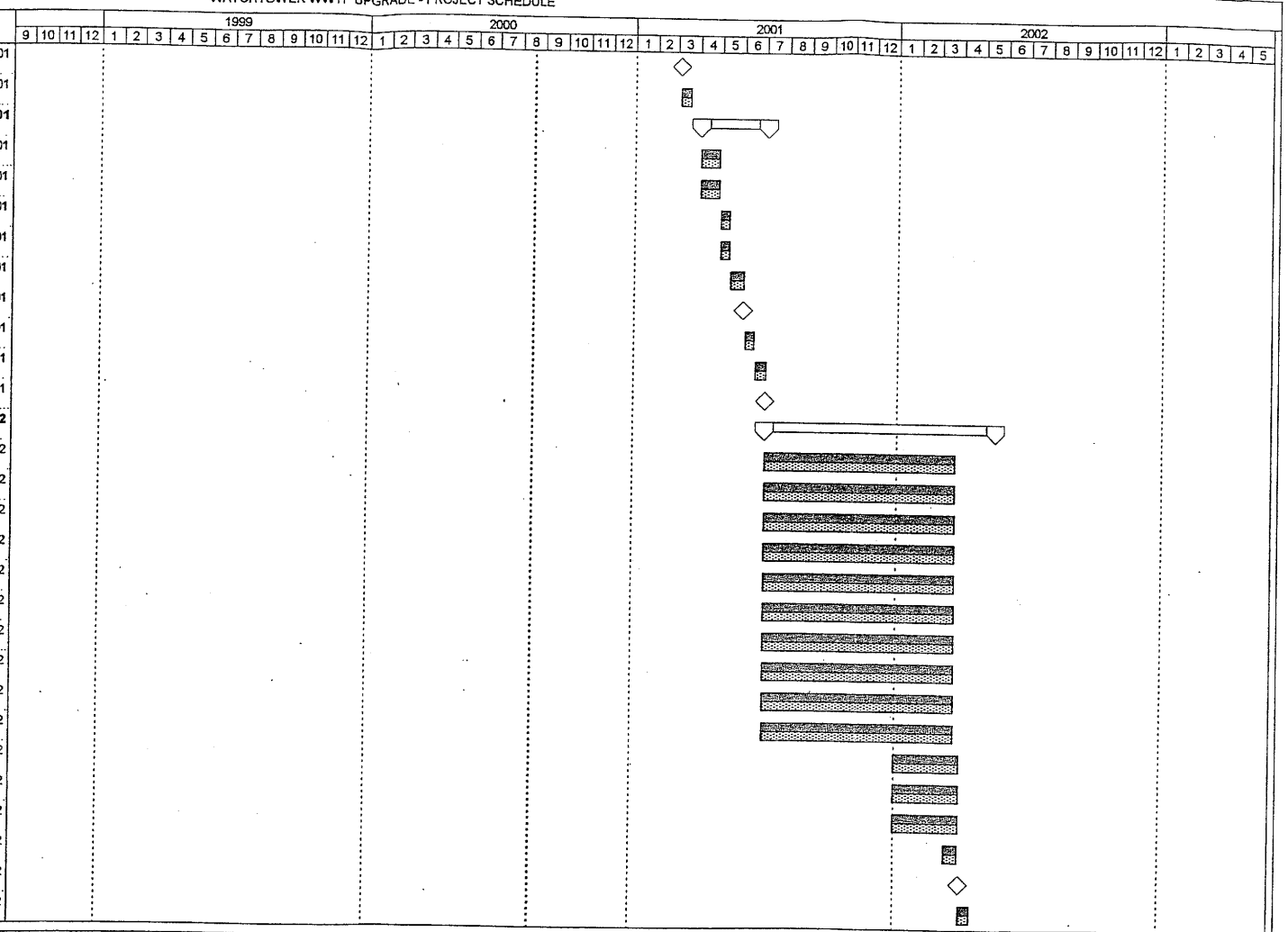


Note :
Thu 8/17/00
edays = elapsed Time (calender days)
days = working days

Task
Progress
Baseline
Milestone
Baseline Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Baseline Summary
Rolled Up Baseline
Rolled Up Baseline Milestone
Rolled Up Progress
Split
Baseline Split
External Tasks
Project Summary

WATCHTOWER WWTP UPGRADE - PROJECT SCHEDULE

ID	Task Name	Start	Finish
30	M7 Submit Approvable FUP	Mon 3/5/01	Mon 3/5/01
31	NYCDEP/EFC Approval	Mon 3/5/01	Mon 3/19/01
32	**2.3 Bidding or Negotiation Phase**	**Mon 4/2/01**	**Mon 7/2/01**
33	2.3.1 Assist in Advertising	Mon 4/2/01	Fri 4/27/01
34	2.3.2 Issue Documents	Mon 4/2/01	Fri 4/27/01
35	2.3.3 Evaluate Bids	Mon 4/30/01	Fri 5/11/01
36	2.3.4 Conform Contract Documents	Mon 4/30/01	Fri 5/11/01
37	2.3.5 Assist with Contract Execution	Mon 5/14/01	Fri 6/1/01
38	M8 Submit Contractor Agreements	Fri 6/1/01	Fri 6/1/01
39	NYCDEP/NYSEFC Approval	Mon 6/4/01	Fri 6/15/01
40	Contractor Notice to Proceed	Mon 6/18/01	Mon 7/2/01
41	2.3.6 Completion of Bid Phase Services	Mon 7/2/01	Mon 7/2/01
42	**2.4 Construction Phase**	**Mon 7/2/01**	**Fri 5/17/02**
43	2.4.1 General Administration	Mon 7/2/01	Fri 3/22/02
44	2.4.2 Site Visits	Mon 7/2/01	Fri 3/22/02
45	2.4.3 Defective work	Mon 7/2/01	Fri 3/22/02
46	2.4.4 Clarifications and interpretations	Mon 7/2/01	Fri 3/22/02
47	2.4.5 Change orders	Mon 7/2/01	Fri 3/22/02
48	2.4.6 Shop Drawings	Mon 7/2/01	Fri 3/22/02
49	2.4.7 Substitutes	Mon 7/2/01	Fri 3/22/02
50	2.4.8 Inspections and Tests	Mon 7/2/01	Fri 3/22/02
51	2.4.9 Dispute Resolution	Mon 7/2/01	Fri 3/22/02
52	2.4.10 Applications for Payment	Mon 7/2/01	Fri 3/22/02
53	2.4.11 Contractor Completion Documents	Mon 12/31/01	Sun 3/31/02
54	2.4.12 Update Compliance Schedule	Mon 12/31/01	Sun 3/31/02
55	2.4.13 Update Plan of Operation/Startup Plan	Mon 12/31/01	Sun 3/31/02
56	2.4.14 Certificate of Functional Completion	Mon 3/11/02	Fri 3/29/02
57	M9 Submit Functional Completion	Mon 4/1/02	Mon 4/1/02
58	NYCDEP/EFC Approval	Mon 4/1/02	Tue 4/16/02



Note :
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Thu 8/17/00

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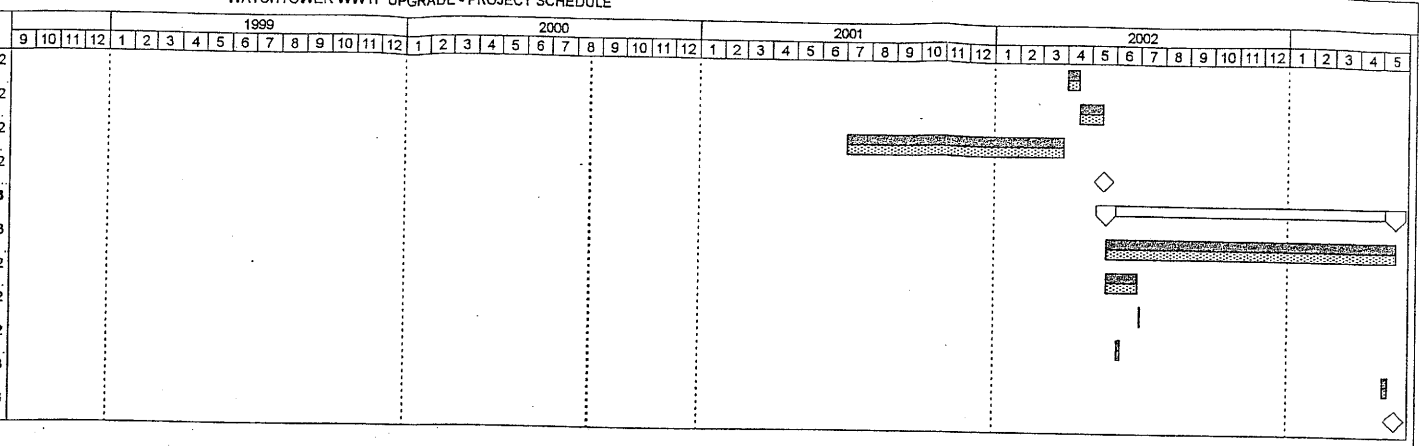
Rolled Up Progress
Split
Baseline Split
External Tasks
Project Summary

WATCHTOWER WWTP UPGRADE - PROJECT SCHEDULE

ID	Task Name	Start	Finish
59	2.4.15 Final Inspection	Mon 4/1/02	Tue 4/16/02
60	2.4.16 Project Closeout Documents	Tue 4/16/02	Thu 5/16/02
61	2.4.17 Duration of Construction Phase	Mon 7/2/01	Wed 3/27/02
62	M10 Construction Close-out Documents	Fri 5/17/02	Fri 5/17/02
63	**2.5 Operation/Performance Testing Phase**	**Mon 5/20/02**	**Fri 5/46/03**
64	2.5.1 Assist with Troubleshooting	Mon 5/20/02	Fri 5/16/03
65	2.5.2 Training	Mon 5/20/02	Fri 6/28/02
66	2.5.3 Record Keeping Assistance	Mon 7/1/02	Mon 7/1/02
67	2.5.4 Update Record Drawings	Mon 6/3/02	Fri 6/7/02
68	2.5.5 Operational Site Visit	Thu 5/1/03	Wed 5/7/03
69	2.5.6 Complete Operation Phase	Fri 5/16/03	Fri 5/16/03



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Rolled Up Milestone
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Split
Baseline Split
External Tasks
Project Summary

Appendix G

Basis of EQ Design Capacity to Handle Reject Water Flows (May 9, 2000 Memo)

Dufresne-Henry
Consulting Engineers

Memorandum

54 Route 106, P.O. Box 29
North Springfield, VT 05150-0029
802-886-2261 fax 802-886-2260
E-Mail: rurban@dufresne-henry.com

To: Norton True, Jeff McDonald, Phil Ledger

From: Bob Urban

Date: May 9, 2000

Subject: Watchtower MF Upgrade Existing EQ Basin Sizing DH 7600005.01

Based on data supplied from Jeff McDonald (attached email) and Watchtower basis of design August 1, 1989, and side stream flow data provided by Charles Roberts of Watchtower, the following information is provided:

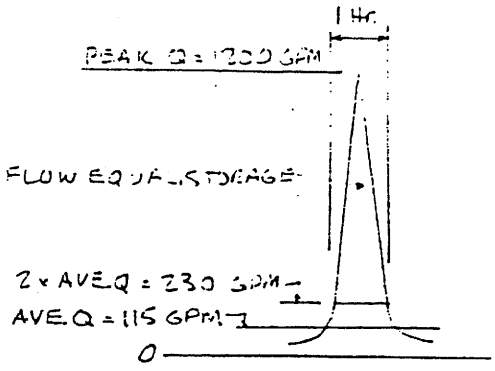
1. EQ basin designed to handle 1,200 gpm for one hour duration. During construction influent pipe invert to EQ was lowered four inches from el 597.0 to el 596.67. This el was field verified by Charles Roberts of Watchtower. Calculations based on 12' x 16' x 10.17' measurements indicates that EQ basin volume has sufficient capacity to handle 1200 gpm flows for one hour duration.

2. Review of 1998 & 1999 maximum hourly flow data indicates maximum rate of 500 gpm. However influent flow meter is calibrated with 500 as peak since unit has a large span and is inaccurate if calibrated to higher level. Charles Roberts indicated that 500 gpm peak is usually a momentary spike lasting for less than a minute. The past two years data indicated there were only 31 days that recorded 500 gpm. Average monthly weekday flow peak flow rates were 409 gpm and weekends 299 gpm for 1998 and 1999. Peak one hour duration always comes between 6 AM to 7 AM.

3. Total side stream projected with upgrade at build out of 0.165 MGD = 33,000 gpd which would be 23 gpm at a continuous rate. Backwash rates from sand filter and MF units are 24,750 gpd or 17 gpm on a continuous basis or utilizing a 15 minute backwash cycle once every two hours approximately a 140 gpm flow rate.

4. Using 500 gpm peak flow rate and dividing by 1999 percent of hydraulic capacity utilized of 57% plus 140 gpm backwash rate equals 1,017 gpm to EQ basin during peak influent period at design flow of 0.165 MGD. Existing EQ basin has sufficient capacity to handle peak flows plus additional backwash flows.

PATTERSON WWTF CALCULATIONS



Clarifier:

Design flow 165,000 gpd
Overflow rate = 300 gpd/ft^2

Net Area = $\frac{165,000}{300}$ = 550 total = 275 ft^2/unit

Add area of 7.5' Ø center well = 44 ft^2/unit
Total area = 319 ft^2/unit

Diameter = $\sqrt{\frac{4A}{\pi}} = \sqrt{\frac{4 \times 319}{\pi}}$ = 20.15' use 20'Ø

Actual overflow rate (excluding center well) = 305 gpd/ft^2

Flow Equalization:

Assumed peak flow in morning due to simultaneous showers = 1200 gpm

If this lasts for 1 hour, volume above (average flow x 2) =
$(1200 - 115 \times 2) \times \frac{60}{2}$ = 29,100 gal

Required Storage = 29,100/7.48 = 3890 ft^3 total or 1945 ft^3/unit
(call 2,000 ft^3)

Aeration:

F/M = 0.11 = $\frac{255 \text{ \#BOD} \times 10^6}{4000 \text{ mg/L} \times 0.7 \times V \times 62.4 \text{ \#/ft}^3}$ or $\frac{255 \text{\# BOD} \times 10^6}{1000 \text{ mg/L} \times 0.7 \times F/M \times 62.4 \text{\#/ft}^3} =$

V = 13,270 ft^3 total Use 6,553 ft^3 per unit (see sht. 2)
Actual F/M = 0.111 Volume required for initial operation with hotel only
(304 persons max. @ 0.17 #/cap.d)
= $\frac{304 \times .17}{255} \times 6,553 \times 2$ = 2,656 ft^3 (includes allowance for temporary kitchen).
Actual F/M with 2,880 ft^3 provide = 0.103

Sludge production including aerobic digester VS destruction =
0.35 x 255 = 89 #/day
Assume 40% VS destruction in aerobic digester. Before digestion:
V = Volatile, F = Fixed.

V (1-0.40) + F = 89 (winter) $\frac{V}{V+F} = 0.7$
F = 89 - 0.6 V
Substituting: V = 0.7 (V + 89 - 0.6 V)

V = 0.7 (0.4V + 89)
0.72 V = 62.3
V = 86.5 #/d

MCRT = $\frac{4,000 \times 13,106 \times 62.4 \times .7}{10^6}$ (volatile solids wasted)

MCRT = $\frac{4,000 \times 13,106 \times 62.4 \times .7}{10^6 \times 86.5}$ = 26.5 days or V = $\frac{86.5 \times 10^6 \times 26.5 \text{ days}}{2800 \text{ MLSS} \times 62.4} = 1314$

91-20-5 (4/98)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

State Pollutant Discharge Elimination System (SPDES)

NOTICE / RENEWAL APPLICATION / PERMIT

Please read **ALL** instructions on the back before completing this application form. Please **TYPE** or **PRINT** clearly in ink.

PART 1 - NOTICE

Date: 11/18/2003

Permittee Contact Name, Title, Address

WATCHTOWER BIBLE & TRACT SOCIETY OF NY
~~TIMOTHY-PIGLINSKI~~ JOEL HEIER
100 WATCHTOWER DR
PATTERSON NY 12563-9204

Facility and SPDES Permit Information

Name: WATCHTOWER EDUCATIONAL CENTER & H
Ind. Code: 8999 County PUTNAM
DEC No.: 3-3724-00045/00002
SPDES No.: 016 5778
Expiration Date: 09/01/2004
Application Due By: 03/05/2004

Are these name(s) & address(es) correct? if not, please write corrections above.

The State Pollutant Discharge Elimination System Permit for the facility referenced above expires on the date indicated.

Submit this application by the "Application Due By" date
listed above in order to keep continuous coverage under your permit.

CAUTION: This short application form and attached questionnaire are the only forms acceptable for permit renewal. Sign Part 2 below and mail this form and the completed questionnaire using the enclosed envelope. *Effective April 1, 1994 the Department no longer assesses SPDES application fees.*

If there are changes to your discharge, or to operations affecting the discharge, then in addition to this renewal application, you must also submit a separate permit modification application to the Regional Permit Administrator for the DEC region in which the facility is located, as required by your current permit. See the reverse side of this page for instructions on filing a modification request.

PART 2 - RENEWAL APPLICATION

CERTIFICATION: I hereby affirm that under penalty of perjury that the information provided on this form and all attachments submitted herewith is true to the best of my knowledge and belief. False statements made herein are punishable as a Class A misdemeanor pursuant to section 210.45 of the Penal Law.

Kent E. Fischer — Name of person signing application (see instructions on back)

Corporation Agent — Title

Signature

1/19/04 — Date

PART 3 - PERMIT (Below this line - Official Use Only)

Effective Date: 9/1/04 **Expiration Date:** 9/1/09

William R. Adriance
Permit Administrator

Address: NYSDEC - Division of Environmental Permits
Bureau of Environmental Analysis
50 Wolf Road, Albany, NY 12233-1750

William R. Adriance
Signature

3/3/04
Date

This permit together with the previous valid permit for this facility issued 8/5/99 and subsequent modifications constitute authorization to discharge wastewater in accordance with all terms, conditions and limitations specified in the previously issued valid permit, modifications thereof or issued as part of this permit, including any special or general conditions attached hereto. Nothing in this permit shall be deemed to waive the Department's authority to initiate a modification of this permit on the grounds specified in 6NYCRR §621.14, 6NYCRR §754.4 or 6NYCRR §757.1 existing at the time this permit is issued or which arise thereafter.

Attachments: General Conditions dated 11/90

91-20-2 (1/89) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

State Pollutant Discharge Elimination System (SPDES)

DISCHARGE PERMIT

Special Conditions (Part I)

Industrial Code: 8999
Discharge Class (CL): 02
Toxic Class (TX): N
Major Drainage Basin: 13
Sub Drainage Basin: 02
Water Index Number: H-31-P44-24-23
Compact Area: Croton

SPDES Number: NY - 0165778
DEC Number: 3-3724- 00027/00002
Effective Date (EDP): 09/01/99
Expiration Date (ExDP): 09/01/04
Modification Date(s):
Attachment(s): General Conditions (Part II) Date: 11/90

This SPDES permit is issued in compliance with Title 8 of Article 17 of the Environmental Conservation Law of New York State and in compliance with the Clean Water Act as amended, (33 U.S.C. Section 1251 et. seq.)(hereafter referred to as "the Act").

PERMITTEE NAME AND ADDRESS

Attention: Kent E. Fischer, General Mgr.

Name: Watchtower Bible & Tract Society of New York, Inc.
Street: 100 Watchtower Drive
City: Patterson State: NY Zip Code: 12563-9204

is authorized to discharge from the facility described below:

FACILITY NAME AND ADDRESS

Name: Watchtower Educational Center & Hotel
Location (C,T,V): Patterson (T) County: Putnam
Facility Address: 100 Watchtower Drive - Attention: Timothy Figlinski, Reg. Mgr.
City: Patterson State: NY Zip Code: 12563-9204
NYTM - E: . NYTM - N: 4 .
From Outfall No.: 001 at Latitude: 41° 29′ 50″ & Longitude: 73° 34′ 50″
into receiving waters known as: Mountain Brook Class: D

and; (list other Outfalls, Receiving Waters & Water Classifications)

(Proposed reclass to C)
NYSDEC has determined that this facility discharges to an intermittent stream as defined in the NYC WR&R.

in accordance with the effluent limitations, monitoring requirements and other conditions set forth in Special Conditions (Part I) and General Conditions (Part II) of this permit.

DISCHARGE MONITORING REPORT (DMR) MAILING ADDRESS

Mailing Name: Watchtower Educational Center & Hotel
Street: 100 Watchtower Drive
City: Patterson State: NY Zip Code: 12563-9204
Responsible Official or Agent: Timothy Figlinski, Reg. Mgr. Phone: (914)878-7000

This permit and the authorization to discharge shall expire on midnight of the expiration date shown and the permittee shall not discharge after the expiration date unless this permit has been renewed, or extended pursuant to law. To be authorized to discharge beyond the expiration date, the permittee shall apply for a permit renewal no less than 180 days prior to the expiration date shown above.

DISTRIBUTION:
J. Marcogliese/E. Zicca
R. Hannaford/E. Reilly
USEPA, Region II
NYCDEP (Valhalla)
Putnam Co. Health Dept.

Permit Administrator: Alexander F. Cieslak, JR. ~~William E. Steidle~~ NYSDEC
Address: 21 South Putt Corners Rd.
New Paltz, NY 12561-1696
Signature: Alexander F. Cieslak, Jr. Date: 8/5/99

Issued 8/5/98

DISCHARGE NOTIFICATION REQUIREMENTS

a) Within ninety days after the effective date of this permit modification, the permittee shall install and maintain identification signs at all outfalls to surface waters listed in this permit. The sign(s) shall be conspicuous, legible and in as close proximity to the point of discharge as is reasonably possible while ensuring the maximum visibility from the surface water and shore. The signs shall be installed in such a manner to pose minimal hazard to navigation, bathing or other water related activities. If the public has access to the water from the land in the vicinity of the outfall, an identical sign shall be posted to be visible from the direction approaching the surface water.

The signs shall have minimum dimensions of eighteen inches by twenty four inches (18" x 24") and shall have white letters on a green background and contain the following information:

N.Y.S. PERMITTED DISCHARGE POINT

SPDES PERMIT No.: NY_____

OUTFALL No. :____

For information about this permitted discharge contact:

Permittee Name: _____

Permittee Contact: _____

Permittee Phone: ( ) - ### - ####

OR:

NYSDEC Division of Water Regional Office Address :

NYSDEC Division of Water Regional Phone: ( ) - ### -####

b) If upon the effective date of this modification, the permittee has installed signs that include the information required by § 17-0815-a(2)(a), but do not meet the specifications listed above, the permittee may continue to use the existing signs for a period of up to five years, after which the signs shall comply with the specifications listed above.

c) The permittee shall periodically inspect the outfall identification signs in order to insure that they are maintained, are still visible and contain information that is current and factually correct.

d) Within ninety days after the effective date of this permit modification, the permittee shall provide for public review at a repository accessible to the public, copies of the Discharge Monitoring Reports (DMRs) as required by the RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS page of this permit. This repository shall be open to the public at a minimum of normal daytime business hours. The repository may be at the business office repository of the permittee or at an off-premises location of its choice (such location shall be the village, town, city or county clerk's office, the local library or other location as approved by the Department). In accordance with the RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS page of your permit, each DMR shall be maintained on record for a period of three years.

INTERIM EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS Modified 1/18/2000

During the period beginning 09/01/1999 the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

LIMITATIONS APPLY: [X] All Year [ ] Seasonal from _____ to _____
Outfall Number 001

EFFLUENT LIMITATIONS

[X] Flow	30 day arithmetic mean	0.165	[X] MGD [ ] GPD	
[X] CBOD, 5 - Day	Daily Maximum	5.0	mg/l and 6.9	lbs/day(1)
[ ] BOD, 5 - Day	7 day arithmetic mean		mg/l and	lbs/day
[ ] UOD(2)			mg/l and	lbs/day
[X] Solids, Suspended	Daily Maximum	10	mg/l and 13.8	lbs/day(1)
[ ] Solids, Suspended	7 day arithmetic mean		mg/l and	lbs/day
[X] Effluent disinfection required: [X] All Year [ ] Seasonal from _____ to _____				
[X] Coliform, Fecal	30 day geometric mean shall not exceed 200/100 ml			
[X] Coliform, Fecal	7 day geometric mean shall not exceed 400/100 ml			
[X] Chlorine, Total Residual	Daily Maximum		0.1	mg/l
[X] pH	Range		6.0 to 9.0	SU
[X] Solids, Settleable	Daily Maximum		0.1	ml/l
[X] Ammonia	Daily Maximum		2.0 mg/l as NH_3	
[X] Dissolved Oxygen	Daily Minimum		Greater than 7.0 mg/l	
[X] Phosphorus	Daily Maximum		1.0 mg/l as P	
[X] Chlorine Total Residual	Minimum		0.5 mg/l	
[ ] in Contact Chamber				
[ ]				

MONITORING REQUIREMENTS

Parameter	Frequency	Sample Type	Sample Location Influent	Sample Location Effluent
[X] Flow, [X] MGD [ ] GPD	Continuous		X	
[X] CBOD, 5 - Day, mg/l	1/month	6 hr. Comp.	X	X
[X] Solids, Suspended, mg/l	1/month	6 hr. Comp.	X	X
[X] Coliform, Fecal, No./100 ml(3)	1/month	Grab		X
[ ] Nitrogen, TKN (as N), mg/l				
[X] Ammonia (as NH_3), mg/l	1/month	6 hr. Comp.		
[X] pH, SU (standard units)	Daily	Grab	X	X
[X] Solids, Settleable, ml/l	Daily	Grab	X	X
[X] Chlorine, Total Residual, mg/l(3)	Daily	Grab		X(4)
[X] Phosphorus, Total (as P), mg/l	1/month	6 hr. Comp.		X
[X] Temperature, Deg. F	Daily	Grab	X	X
[X] Dissolved Oxygen, mg/l	Daily	Grab	X	X
[ ]				
[ ]				

NOTES: (1) and effluent value shall not exceed ___ % and ___ % of influent values for BOD_5 & TSS respectively.
(2) Ultimate Oxygen Demand shall be computed as follows:
UOD = 1 ½ x $CBOD_5$ + 4 ½ x TKN (Total Kjeldahl Nitrogen)
(3) Monitoring of these parameters is only required during the period when disinfection is required. The operator/permittee shall physically inspect the disinfection equipment daily to insure it is operating properly and must maintain a written log of the inspections.
(4) Sample contact chamber effluent and final effluent limits are specified for both.

Issued 8/5/99

FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning six months from the date of NYCDEP certification of "functional completion" of the facility's upgrade as required in the facility's Final Upgrade Plan the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

LIMITATIONS APPLY: [ ] All Year [X] Seasonal from June 1 to October 31

Outfall Number 001

EFFLUENT LIMITATIONS

[X] Flow	30 day arithmetic mean	0.165	[X] MGD [ ] GPD	
[ ] BOD, 5 - Day	30 day arithmetic mean		mg/l and	lbs/day(1)
[ ] BOD, 5 - Day	7 day arithmetic mean		mg/l and	lbs/day
[ ] UOD(2)			mg/l and	lbs/day
[ ] Solids, Suspended	30 day arithmetic mean		mg/l and	lbs/day(1)
[ ] Solids, Suspended	7 day arithmetic mean		mg/l and	lbs/day
[X] Effluent disinfection required: [X] All Year [ ] Seasonal from			to	
[X] Coliform, Fecal	30 day geometric mean shall not exceed 200/100 ml			
[X] Coliform, Fecal	7 day geometric mean shall not exceed 400/100 ml			
[X] Chlorine, Total Residual	Daily Maximum	0.1		mg/l
[X] pH	Range	6.5 to 8.5		SU
[X] Solids, Settleable	Daily Maximum	0.1		ml/l
[X] Ammonia	Daily Maximum	1.5 mg/l as NH_3		
[X] CBOD, 5-Day	Daily Maximum	5.0 mg/l		
[X] Suspended Solids	Daily Maximum	10 mg/l		
[X] Dissolved Oxygen	Daily Minimum	7.0 mg/l		
[X] Phosphorus, Total	30 Day Average	0.5 mg/l as P		

MONITORING REQUIREMENTS

Parameter	Frequency	Sample Type	Sample Location Influent	Sample Location Effluent
[X] Flow, [X] MGD [ ] GPD	Continuous	Recorder	X	
[X] CBOD, 5 - Day, mg/l	1/month	6 hr. Comp.	X	X
[X] Solids, Suspended, mg/l	1/month	6 hr. Comp.	X	X
[X] Coliform, Fecal, No./100 ml(3)	1/month	Grab		X
[ ] Nitrogen, TKN (as N), mg/l				
[X] Ammonia (as NH_3), mg/l	1/month	6 hr. Comp.		X
[X] pH, SU (standard units)	1/day	Grab	X	X
[X] Solids, Settleable, ml/l	1/day	Grab	X	X
[X] Chlorine, Total Residual, mg/l(3,4)	1/day	Grab		X
[X] Phosphorus, Total (as P), mg/l	1/month	6 hr. Comp.		X
[X] Temperature, Deg. F	1/day	Grab	X	X
[X] Dissolved Oxygen, mg/l	1/day	Grab		X
[ ]				

NOTES:
(1) and effluent value shall not exceed ___ % and ___ % of influent values for $CBOD_5$ & TSS respectively.
(2) Ultimate Oxygen Demand shall be computed as follows:
UOD = 1 ½ x $CBOD_5$ + 4 ½ x TKN (Total Kjeldahl Nitrogen)
(3) Monitoring of these parameters is only required during the period when disinfection is required. The operator/permittee shall physically inspect the disinfection equipment daily to insure it is operating properly and must maintain a written log of the inspections.
(4) If Chlorine is used for disinfection.

Issued 8/5/99

FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning six months from the date of NYCDEP certification of "functional completion" of the facility's upgrade as required by the facility's Final Upgrade Plan the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

LIMITATIONS APPLY: [ ] All Year [X] Seasonal from November 1 to May 31

Outfall Number 001

EFFLUENT LIMITATIONS

[X] Flow	30 day arithmetic mean	0.165	[X] MGD [ ] GPD	
[ ] BOD, 5 - Day	30 day arithmetic mean		mg/l and	lbs/day(1)
[ ] BOD, 5 - Day	7 day arithmetic mean		mg/l and	lbs/day
[ ] UOD(2)			mg/l and	lbs/day
[ ] Solids, Suspended	30 day arithmetic mean		mg/l and	lbs/day(1)
[ ] Solids, Suspended	7 day arithmetic mean		mg/l and	lbs/day
[X] Effluent disinfection required:	[X] All Year [ ] Seasonal from		to	
[X] Coliform, Fecal	30 day geometric mean shall not exceed 200/100 ml			
[X] Coliform, Fecal	7 day geometric mean shall not exceed 400/100 ml			
[X] Chlorine, Total Residual	Daily Maximum	0.1		mg/l
[X] pH	Range	6.5 to 8.5		SU
[X] Solids, Settleable	Daily Maximum	0.1		ml/l
[X] Ammonia	Daily Maximum	2.0 mg/l as NH_3		
[X] CBOD, 5-Day	Daily Maximum	5.0 mg/l		
[X] Suspended Solids	Daily Maximum	10 mg/l		
[X] Dissolved Oxygen	Daily Minimum	7.0 mg/l		
[X] Phosphorus, Total	30 Day Average	0.5 mg/l as P		

MONITORING REQUIREMENTS

Parameter	Frequency	Sample Type	Sample Location Influent	Sample Location Effluent
[X] Flow, [X] MGD [ ] GPD	Continuous	Recorder	X	
[X] CBOD, 5 - Day, mg/l	1/month	6 hr. Comp.	X	X
[X] Solids, Suspended, mg/l	1/month	6 hr. Comp.	X	X
[X] Coliform, Fecal, No./100 ml(3)	1/month	Grab		X
[ ] Nitrogen, TKN (as N), mg/l				
[X] Ammonia (as NH_3), mg/l	1/month	6 hr. Comp.		X
[X] pH, SU (standard units)	1/day	Grab	X	X
[X] Solids, Settleable, ml/l	1/day	Grab	X	X
[X] Chlorine, Total Residual, mg/l(3,4)	1/day	Grab		X
[X] Phosphorus, Total (as P), mg/l	1/month	6 hr. Comp.		X
[X] Temperature, Deg. F	1/day	Grab	X	X
[X] Dissolved Oxygen, mg/l	1/day	Grab		X
[ ]				

NOTES:
(1) and effluent value shall not exceed ___ % and __ % of influent values for $CBOD_5$ & TSS respectively.
(2) Ultimate Oxygen Demand shall be computed as follows:
UOD = 1 ½ x $CBOD_5$ + 4 ½ x TKN (Total Kjeldahl Nitrogen)
(3) Monitoring of these parameters is only required during the period when disinfection is required. The operator/permittee shall physically inspect the disinfection equipment daily to insure it is operating properly and must maintain a written log of the inspections.
(4) If Chlorine is used for disinfection.

FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FOR PATHOGEN REDUCTION

During the period beginning six months from the date of NYCDEP certification of "functional completion" of the facility's upgrade, as required in the facility's Final Upgrade Plan the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

Outfall Number & Effluent Parameter	Discharge Limitations Daily Avg.	Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Sample Type
001					
Giardia Lamblia, Cysts	(Note 1)		NA	NA	NA
Enteric Viruses	(Note 2)		NA	NA	NA
Turbidity	(Note 3)		NTU	Continuous	Recorder (After microfiltration/equivalent)
Chlorine Residual	(Note 4)		Mg/l	1/Day	Grab (Chlorine contact tank prior to dechlorination)

Note 1 - Facility must be capable of achieving a 99.9% removal and/or inactivation of giardia lamblia cysts. Capability shall be demonstrated by maintaining the turbidity and chlorine levels specified and operating the microfiltration unit and the disinfection system on a continuous basis, in accordance with the provisions set forth in the WWTP's Operation and Maintenance Manual.

Note 2 - Facility must be capable of achieving 99.99% removal/inactivation of enteric viruses. Capability shall be demonstrated as stated above in Note 1.

Note 3 - The turbidity levels shall be maintained at less than or equal to 0.5 NTU in 95% of the measurements taken each month and an instantaneous maximum of 5.0 NTU.

Note 4 - When chlorine is used for disinfection, a minimum residual of 0.2 mg/l shall be maintained in the chlorine contact tank prior to dechlorination.

MODIFIED: 1/12/01 (WES)

FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FOR PATHOGEN REDUCTION

During the period beginning 9/9/1997 and lasting until 09/01/04 the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

Outfall Number & Effluent Parameter	Discharge Limitations Daily Avg.	Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Sample Type

DISCHARGE AUTHORIZED FOR THE MONTHS APRIL 1 THRU OCTOBER 31 ONLY

Outfall 002

Up to 30,000 GPD of treated final effluent from Outfall 001 may be diverted to irrigate lawns and shrubs on Permittee's property. All effluent limitations as contained on Page #5 shall be complied with. Construction and operation shall be consistent with approvals obtained from the Putnam County Health Department, New York City Department of Environmental Protection and the New York State Health Department.

RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS

a) The permittee shall also refer to the General Conditions (Part II) of this permit for additional information concerning monitoring and reporting requirements and conditions.

b) The monitoring information required by this permit shall be summarized, signed and retained for a period of three years from the date of the sampling for subsequent inspection by the Department or its designated agent. **Also;**

[X] (if box is checked) monitoring information required by this permit shall be summarized and reported by submitting completed and signed Discharge Monitoring Report (DMR) forms for each 1 month reporting period to the locations specified below. Blank forms are available at the Department's Albany office listed below. The first reporting period begins on the effective date of this permit and the reports will be due no later than the 28th day of the month following the end of each reporting period.

Send the original (top sheet) of each DMR page to:

Department of Environmental Conservation
Division of Water
Bureau of Watershed Compliance Programs
50 Wolf Road
Albany, New York 12233-3506

Phone: (518) 457-3790

Putnam Co. Health Dept.
4 Geneva Road
Brewster, NY 10501

Send the first copy (second sheet) of each DMR page to:

Department of Environmental Conservation
Regional Water Engineer
Region 3
200 White Plains Road - 5th Floor
Tarrytown, NY 10591-5805

c) A monthly "Wastewater Facility Operation Report..." (form 92-15-7) shall be submitted (if box is checked) to the [X] Regional Water Engineer and/or [X] County Health Department or Environmental Control Agency listed above.

d) Noncompliance with the provisions of this permit shall be reported to the Department as prescribed in the attached General Conditions (Part II).

e) Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

f) If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR Part 136 or as specified in this permit, the results of this monitoring shall be included in the calculations and recording on the Discharge Monitoring Reports.

g) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this permit.

h) Unless otherwise specified, all information recorded on the Discharge Monitoring Report shall be based upon measurements and sampling carried out during the most recently completed reporting period.

Any laboratory test or sample analysis required by this permit for which the State Commissioner of Health issues certificates of approval pursuant to section five hundred two of the Public Health Law shall be conducted by a laboratory which has been issued a certificate of approval. Inquiries regarding laboratory certification should be sent to the Environmental Laboratory Accreditation Program, New York State Health Department Center for Laboratories and Research, Division of Environmental Sciences, The Nelson A. Rockefeller State Plaza, Albany, New York 12201.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

State Pollutant Discharge Elimination System (SPDES) DISCHARGE PERMIT

First3.99

Industrial Code:	**8999**	SPDES Number:	**NY- 0165778**
Discharge Class (CL):	**02**	DEC Number:	**3-3724-00045/00004**
Toxic Class (TX):	**N**	Effective Date (EDP):	**09/01/09**
Major Drainage Basin:	**13**	Expiration Date (ExDP):	**08/31/14**
Sub Drainage Basin:	**02**	Modification Dates:(EDPM)	**09/01/09**
Water Index Number:	**H-31-P44-24-23**		
Compact Area:	**Croton**		

This SPDES permit is issued in compliance with Title 8 of Article 17 of the Environmental Conservation Law of New York State and in compliance with the Clean Water Act, as amended, (33 U.S.C. §1251 et.seq.)(hereinafter referred to as "the Act").

PERMITTEE NAME AND ADDRESS

Name: **Watchtower Bible and Tract Society of New York, Inc.** Attention: **Kent E. Fischer, General Manager**
Street: **100 Watchtower Drive**
City: **Patterson** State: **NY** Zip Code: **12563**
is authorized to discharge from the facility described below:

FACILITY NAME AND ADDRESS

Name: **Watchtower Educational Center and Hotel**
Location (C,T,V): **(T) Patterson** County: **Putnam**
Facility Address: **100 Watchtower Drive**
City: **Patterson** State: **NY** Zip Code: **12563**
NYTM -E: NYTM - N:
From Outfall No.: **001** at Latitude: **41 ° 29 ' 50 "** & Longitude: **73 ° 34 ' 50 "**
into receiving waters known as: **Mountain Brook** Class: **C**
and; (list other Outfalls, Receiving Waters & Water Classifications) **002 Groundwater** Class: **GA**
NYSDEC has determined that this facility discharges to an intermittent stream as defined in the NYC WR&R.

in accordance with: effluent limitations; monitoring and reporting requirements; other provisions and conditions set forth this permit; and 6 NYCRR Part 750-1.2(a) and 750-2.

DISCHARGE MONITORING REPORT (DMR) MAILING ADDRESS

Mailing Name: **Watchtower Educational Center and Hotel**
Street: **100 Watchtower Drive**
City: **Patterson** State: **NY** Zip Code: **12563**
Responsible Official or Agent: **Environmental Manager** Phone: **(845) 306-1000**

This permit and the authorization to discharge shall expire on midnight of the expiration date shown above and the permittee shall not discharge after the expiration date unless this permit has been renewed, or extended pursuant to law. To be authorized to discharge beyond the expiration date, the permittee shall apply for permit renewal not less than 180 days prior to the expiration date shown above.

DISTRIBUTION:

EPA Region II - Michelle Josilo
Putnam Co. Health Dept.
Town of Patterson Supervisor
NYSEFC
NYCDEP (Valhalla)

DEC BWP - Permit Coordinator, CO
T. Rudolph/ E. Zicca, DEC DOW, WP
Armand DeAngelis, DEC DOW, WP

Permit Administrator:: Alexander F. Ciesluk, Jr
Address: 21 South Put Corners Road
New Paltz, NY 12561
Signature: Alexander F. Ciesluk, Jr. Date: 07/01/2009

PERMIT LIMITS, LEVELS AND MONITORING DEFINITIONS

OUTFALL	WASTEWATER TYPE	RECEIVING WATER	EFFECTIVE	EXPIRING
	This cell describes the type of wastewater authorized for discharge. Examples include process or sanitary wastewater, storm water, non-contact cooling water.	This cell lists classified waters of the state to which the listed outfall discharges.	The date this page starts in effect. (e.g. EDP or EDPM)	The date this page is no longer in effect. (e.g. ExDP)

PARAMETER	MINIMUM	MAXIMUM	UNITS	SAMPLE FREQ.	SAMPLE TYPE
e.g. pH, TRC, Temperature, D.O.	The minimum level that must be maintained at all instants in time.	The maximum level that may not be exceeded at any instant in time.	SU, °F, mg/l, etc.		

PARA-METER	EFFLUENT LIMIT	PRACTICAL QUANTITATION LIMIT (PQL)	ACTION LEVEL	UNITS	SAMPLE FREQUENCY	SAMPLE TYPE
	Limit types are defined below in Note 1. The effluent limit is developed based on the more stringent of technology-based standards, required under the Clean Water Act, or New York State water quality standards. The limit has been derived based on existing assumptions and rules. These assumptions include receiving water hardness, pH and temperature; rates of this and other discharges to the receiving stream; etc. If assumptions or rules change the limit may, after due process and modification of this permit, change.	For the purposes of compliance assessment, the analytical method specified in the permit shall be used to monitor the amount of the pollutant in the outfall to this level, provided that the laboratory analyst has complied with the specified quality assurance/quality control procedures in the relevant method. Monitoring results that are lower than this level must be reported, but shall not be used to determine compliance with the calculated limit. This PQL can be neither lowered nor raised without a modification of this permit.	Type I or Type II Action Levels are monitoring requirements, as defined below in Note 2, that trigger additional monitoring and permit review when exceeded.	This can include units of flow, pH, mass, Temperature, concentration. Examples include µg/l, lbs/d, etc.	Examples include Daily, 3/week, weekly, 2/month, monthly, quarterly, 2/yr and yearly.	Examples include grab, 24 hour composite and 3 grab samples collected over a 6 hour period.

Note 1: DAILY DISCHARGE: The discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for the purposes of sampling. For pollutants expressed in units of mass, the 'daily discharge' is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the 'daily discharge' is calculated as the average measurement of the pollutant over the day. DAILY MAX: The highest allowable daily discharge. DAILY MIN: The lowest allowable daily discharge. MONTHLY AVG (daily avg): The highest allowable average of daily discharges over a calendar month, calculated as the sum of each of the daily discharges measured during a calendar month divided by the number of daily discharges measured during that month. RANGE: The minimum and maximum instantaneous measurements for the reporting period must remain between the two values shown. 7 DAY ARITHMETIC MEAN (7 day average): The highest allowable average of daily discharges over a calendar week. 12 MRA (twelve month rolling avg): The average of the most recent twelve month's monthly averages. 30 DAY GEOMETRIC MEAN (30 d geo mean): The highest allowable geometric mean of daily discharges over a calendar month, calculated as the antilog of : the sum of the log of each of the daily discharges measured during a calendar month divided by the number of daily discharges measured during that month. 7 DAY GEOMETRIC MEAN (7 d geo mean): The highest allowable geometric mean of daily discharges over a calendar week.

Note 2: ACTION LEVELS: Routine Action Level monitoring results, if not provided for on the Discharge Monitoring Report (DMR) form, shall be appended to the DMR for the period during which the sampling was conducted. If the additional monitoring requirement is triggered as noted below, the permittee shall undertake a short-term, high-intensity monitoring program for the parameter(s). Samples identical to those required for routine monitoring purposes shall be taken on each of at least three consecutive operating and discharging days and analyzed. Results shall be expressed in terms of both concentration and mass, and shall be submitted no later than the end of the third month following the month when the additional monitoring requirement was triggered. Results may be appended to the DMR or transmitted under separate cover to the same address. If levels higher than the Action Levels are confirmed, the permit may be reopened by the Department for consideration of revised Action Levels or effluent limits. The permittee is not authorized to discharge any of the listed parameters at levels which may cause or contribute to a violation of water quality standards. TYPE I : The additional monitoring requirement is triggered upon receipt by the permittee of any monitoring results in excess of the stated Action Level. TYPE II: The additional monitoring requirement is triggered upon receipt by the permittee of any monitoring results that show the stated action level exceeded for four of six consecutive samples, or for two of six consecutive samples by 20 % or more, or for any one sample by 50 % or more.

PERMIT LIMITS, LEVELS AND MONITORING

OUTFALL No.	LIMITATIONS APPLY:	RECEIVING WATER	EFFECTIVE	EXPIRING
001	All year unless otherwise noted	Mountain Brook	EDPM	08/31/14

PARAMETER	EFFLUENT LIMIT					MONITORING REQUIREMENTS				FN
	Type	Limit	Units	Limit	Units	Sample Frequency	Sample Type	Location		
								Influent	Effluent	
Flow	Monthly avg	0.165	mgd			Continuous	Recorder	X	X	(1)
$CBOD_5$	Daily max	5.0	mg/l			1/month	6-hr comp	X	X	
Solids, Suspended	Daily max	10	mg/l			1/month	6-hr comp	X	X	
Solids, Settleable	Daily max	0.1	ml/l			1/day	Grab	X	X	
pH	Range	6.50 – 8.5	SU			1/day	Grab	X	X	
Ammonia (as NH3) (June 1 – October 31)	Daily max	1.5	mg/l			1/month	6-hr comp		X	
Ammonia (as NH3) (November 1 – May 31)	Daily max	2.0	mg/l			1/month	6-hr comp		X	
Phosphorus, Total (as P)	Monthly avg	0.5	mg/l			1/month	6-hr comp		X	
Temperature	Monitor	-	Deg F			1/day	Grab	X	X	
Dissolved Oxygen	Daily min	7.0	mg/l			1/day	Grab		X	
Effluent Disinfection required: [X] All Year [ ] Seasonal from to										
Coliform, Fecal	30 day geometric mean	200	No./100 ml			1/month	Grab		X	
Coliform, Fecal	7 day geometric mean	400	No./100 ml			1/month	Grab		X	
Chlorine, Total Residual	Daily max	0.1	mg/l			1/day	Grab		X	(2)

FOOTNOTES:

(1) The authorized flow monitoring location will change from influent to effluent, effective January 1, 2010.

(2) If chlorine is used for disinfection.

PERMIT LIMITS, LEVELS AND MONITORING

OUTFALL No.	LIMITATIONS APPLY:	RECEIVING WATER	EFFECTIVE	EXPIRING
002 (3)	All year unless otherwise noted	Groundwater	EDPM	08/31/14

PARAMETER	EFFLUENT LIMIT					MONITORING REQUIREMENTS				FN
	Type	Limit	Units	Limit	Units	Sample Frequency	Sample Type	Location		
								Influent	Effluent	
Flow	Daily max	0.03	mgd							(4)

FOOTNOTES:

(3) Discharge authorized April 1 through October 31 only.

(4) Up to 0.03 mgd (30,000 gpd) of treated final effluent from Outfall 001 may be diverted to irrigate lawns and shrubs on Permittee's property. All effluent limitations as contained on Page 3 shall be complied with. Construction and operation shall be consistent with approvals obtained from the Putnam County Health Department, New York City Department of Environmental Protection and the New York State Health Department.

FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FOR PATHOGEN REDUCTION

The discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

	Discharge Limitations		Minimum Monitoring Requirements	
Outfall Number & Effluent Parameter	Monthly Avg	Units	Measurement Frequency	Sample Type
Outfall 001				
Giardia Lamblia, Cysts	(Note 1)	NA	NA	NA
Enteric Viruses	(Note 1)	NA	NA	NA
Turbidity	(Note 2)	NTU	Continuous	Recorder
Chlorine Residual	(Note 3)	Mg/l	1/day	Grab

Note 1 - The facility must be capable of achieving a 99.9% removal and/or inactivation of giardia lamblia cysts and enteric viruses. The capability shall be demonstrated by maintaining the turbidity and chlorine levels specified and operating the microfiltration unit and the disinfection system on a continuous basis, in accordance with the provisions set forth in the WWTP's Operation and Maintenance Manual.

Note 2 - The turbidity levels shall be maintained at less than or equal to 0.5 NTU in 95% of the measurements taken each month and an instantaneous maximum of 5.0 NTU shall not be exceeded.

Note 3 - When chlorine is used for disinfection, a minimum residual of 0.2 mg/l shall be maintained in the chlorine contact tank prior to dechlorination.

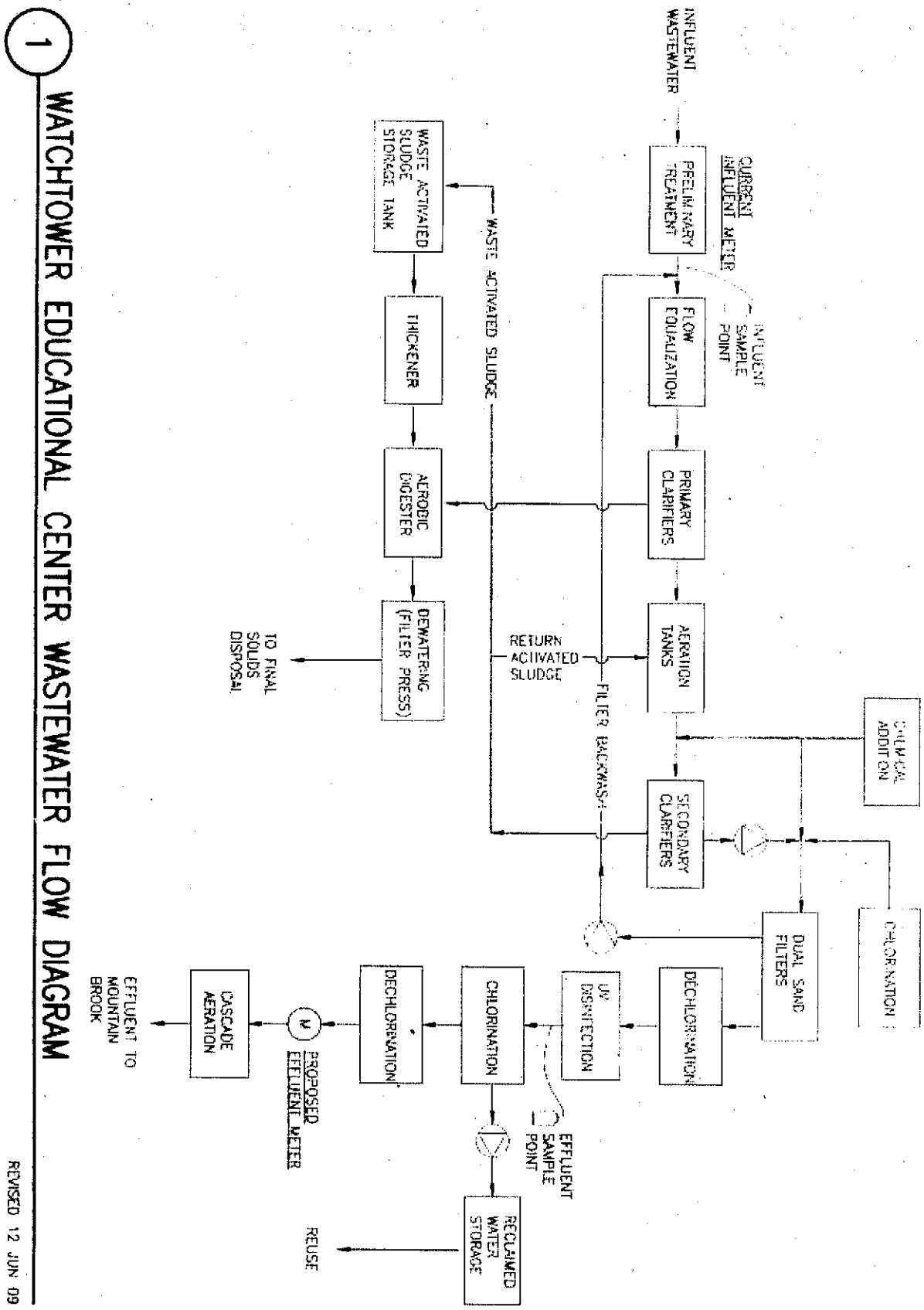
MONITORING LOCATIONS

The permittee shall take samples and measurements, to comply with the monitoring requirements specified in this permit, at the location(s) specified below:

Influent Sample Point – at the plant headworks, downstream of the grit channel, and immediately upstream of the cascade aerator.

Effluent Sample Point (001) – downstream of the UV disinfection units and immediately upstream of the cascade aerator. Effluent DO and pH sampled in manhole immediately after the cascade aerator.

SEE NEXT PAGE FOR DIAGRAM



1 WATCHTOWER EDUCATIONAL CENTER WASTEWATER FLOW DIAGRAM

REVISED 12 JUN 09

DISCHARGE NOTIFICATION REQUIREMENTS

a) The permittee shall maintain the existing identification signs at all outfalls to surface waters, which have not been waived by the Department in accordance with 17-0815-a. The sign(s) shall be conspicuous, legible and in as close proximity to the point of discharge as is reasonably possible while ensuring the maximum visibility from the surface water and shore. The signs shall be installed in such a manner to pose minimal hazard to navigation, bathing or other water related activities. If the public has access to the water from the land in the vicinity of the outfall, an identical sign shall be posted to be visible from the direction approaching the surface water.

The signs shall have **minimum** dimensions of eighteen inches by twenty four inches (18" x 24") and shall have white letters on a green background and contain the following information:

N.Y.S. PERMITTED DISCHARGE POINT

SPDES PERMIT No.: NY_____

OUTFALL No. :____

For information about this permitted discharge contact:

Permittee Name:

_____

Permittee Contact:

_____

Permittee Phone: ( ) - ### - ####

OR:

NYSDEC Division of Water Regional Office Address :

NYSDEC Division of Water Regional Phone: ( ) - ### -####

b) For each discharge required to have a sign in accordance with a), the permittee shall provide for public review at a repository accessible to the public, copies of the Discharge Monitoring Reports (DMRs) as required by the RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS page of this permit. This repository shall be open to the public, at a minimum, during normal daytime business hours. The repository may be at the business office repository of the permittee or at an off-premises location of its choice (such location shall be the village, town, city or county clerk's office, the local library or other location as approved by the Department). In accordance with the RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS page of your permit, each DMR shall be maintained on record for a period of five years.

c) The permittee shall periodically inspect the outfall identification signs in order to ensure that they are maintained, are still visible and contain information that is current and factually correct.

RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS

a) The permittee shall also refer to 6 NYCRR Part 750-1.2(a) and 750-2 for additional information concerning monitoring and reporting requirements and conditions.

b) The monitoring information required by this permit shall be summarized, signed and retained for a period of five years from the date of the sampling for subsequent inspection by the Department or its designated agent. **Also, monitoring information required by this permit shall be summarized and reported by submitting;**

[X] (if box is checked) completed and signed Discharge Monitoring Report (DMR) forms for each 1 month reporting period to the locations specified below. Blank forms are available at the Department's Albany office listed below. The first reporting period begins on the effective date of this permit and the reports will be due no later than the 28th day of the month following the end of each reporting period.

[ ] (if box is checked) an annual report to the Regional Water Engineer at the address specified below. The annual report is due by February 1 and must summarize information for January to December of the previous year in a format acceptable to the Department.

[X] (if box is checked) a monthly "Wastewater Facility Operation Report..." (form 92-15-7) to the:

[X] Regional Water Engineer and/or [X] County Health Department or Environmental Control Agency specified below

Send the DMRs with **original signatures** to:

NYS Department of Environmental Conservation
Division of Water
Bureau of Water Compliance Programs
625 Broadway
Albany, New York 12233-3506
Phone: (518) 402-8177

Send a **copy** of each DMR page to:

NYS Department of Environmental Conservation
Regional Water Engineer
Region 3
100 Hillside Avenue, Suite 1W
White Plains, NY 10603-2860
Phone: (914) 428-2505

Send an **additional copy** of each DMR page to:

Putnam County Health Department
4 Geneva Road
Brewster, NY 10509

NYC Department of Environmental Protection
465 Columbus Avenue, Suite 350
Valhalla, NY 10595

c) Noncompliance with the provisions of this permit shall be reported to the Department as prescribed in 6 NYCRR Part 750-1.2(a) and 750-2.

d) Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

e) If the permittee monitors any pollutant more frequently than required by the permit, using test procedures approved under 40 CFR Part 136 or as specified in this permit, the results of this monitoring shall be included in the calculations and recording of the data on the Discharge Monitoring Reports.

f) Calculation for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this permit.

g) Unless otherwise specified, all information recorded on the Discharge Monitoring Report shall be based upon measurements and sampling carried out during the most recently completed reporting period.

h) Any laboratory test or sample analysis required by this permit for which the State Commissioner of Health issues certificates of approval pursuant to section five hundred two of the Public Health Law shall be conducted by a laboratory which has been issued a certificate of approval. Inquiries regarding laboratory certification should be sent to the Environmental Laboratory Accreditation Program, New York State Health Department Center for Laboratories and Research, Division of Environmental Sciences , The Nelson A. Rockefeller Empire State Plaza, Albany, New York 12201.