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SEWAGE FACILITIES

I. Introduction

General

This report deals with three items:

1. A brief description of the sewerage system and how it operates
2. New facilities that will be required and a breakdown of costs.
3. A proposed rate schedule to cover the cost of improvements

As in any operation of this type, inflation plays a part. This is not, however, the primary reason for an increase in the sewerage service charge. An increased awareness in the environment by the public has brought about Federal and State legislation aimed at vastly improving the quality of sewerage treatment. This legislation in the form of our NPDES Sewerage Discharge Permit requires upgrading of our collection system and sludge disposal system.

II. Existing Facilities

Treatment Plant

Process Theory

The treatment system employed at the Newberg Sewerage Treatment Plant is generally referred to as the activated sludge process. In this system the incoming waste is first degrittied , ground, clarified by primary clarifiers and is then discharged into an aeration basin where microorganisms utilize the raw waste as a food source to obtain energy and to produce more organisms. The organisms that are produced in the aeration basin flocculate into a settleable mass that can be removed by the secondary clarifiers. The overflow from the clarifiers is disinfected and discharged into the receiving stream. Most of the solids removed in the clarifier are returned to the aeration basin to provide a high concentration of biologically active solids, and thus a high degree of treatment. A portion of the solids removed by the clarifier are wasted. The waste solids can be disposed of by further biological treatment and landfill. In the activated sludge process, BOD removals in the range of 90 to 95 percent are attainable, depending on process design and type of waste water treated.¹

Plant Data

The treatment plant was designed on the following load estimates:

Average Flow	2.0 mgd
Maximum Flow	6.0 mgd
BOD, Raw Sewerage	3,200 lb/day
Suspended Solids, Raw Sewerage	2,000 lb/day

Treatment Plant (cont.)

The 1973/74 fiscal year average plant loadings were:

Average Flow	1.23 mgd
Average BOD	2,186 lb/day
Average Suspended Solids	1,095 lb/day

The flows reaching the plant go from a low of 0.7 mgd to a high of over 3.0 mgd with some, as of yet, indeterminate amount by-passing the plant. In general the plant gives excellent results with BOD reductions in the neighborhood of 95%.

Financially the plant is worth close to \$1.5 million and Operation and Maintenance costs should be approximately \$120,000 to \$140,000.²

Collection System

The sewerage collection system for the City consists of approximately 168,000 feet (32 miles) of sewer main ranging in size from 6" to 16". Materials include clay tile, concrete and asbestos cement. Much of this pipe, 87,000 feet (16 miles), was constructed around 1912. As a rule of thumb the length of pipe in the house connections about equals the length of the main. So that overall there is approximately 336,000 feet (64 miles) of pipe involved in the transportation of sewerage. Probably the majority of this pipe must be considered sub-standard when measured by today's tough environmental standards.

III. Facilities Planning

General

The City of Newberg Sewerage Disposal Plant is governed by a " National Pollutant Discharge Elimination System" (NPDES) Waste Discharge Permit. This is a Federal permit that the State of Oregon is administered by the State Department of Environmental Quality. The City is one of the earlier applicants to receive its permit. It gives general conditions and specific requirements for each treatment plant, that must be complied with. All of the following items are dealt with in the permit or directly with the Department of Environmental Quality with the exception of the Operations and Maintenance requirements.

In Plant Improvements

Operations and Maintenance

This item is taken from the 1974/75 budget and is mentioned here only to give an overall view of revenue requirements. With the increased amount of laboratory work it is anticipated that this is somewhat low. This is a yearly requirement of presently \$100,000.00.

Clarifier and Chlorine Contact Chamber Improvements

On January 9, 1974 the City received a letter from the Department of Environmental Quality requesting an Engineering Report on the above items along with the sludge handling system mentioned in the next paragraph. The engineering firm of CH₂M - Hill was retained to complete the report which is on file in the City Engineering Department.

The estimated clarifier improvement requires \$22,500.

The estimated chlorine chamber work requires \$5,000.

Sludge Disposal System

Again CH₂M - Hill was retained to report on an acceptable Sludge Disposal System required by the afore mentioned letter and also our NPEDS permit. A two-phase concept was developed that would spread the cost of these improvements over a period of time and be adequate for the life of the plant. This report is also on file in the City Engineering Department. The requirements would be: Phase #1 - \$26,000.00, and Phase #2 - \$50,000.00 .

Sewer Line Improvements

On August 1, 1974 the City was notified that its NPDES permit would be modified to include a Inflow / Infiltration program. This program has as its objective the removal of extraneous water, storm water and groundwater infiltration from the collection system. The "Federal Water Pollution Control Act Ammendments of 1972", Public Law 92-500 states in effect that any water reaching the sewer system must be given adequate treatment.

Numerous complaints received during November 1973 and December 1974 from residents with sewerage in their basements. Plumbing facilities backing up would indicate that the problem is severe in some areas. Along with this, the increased population expected will impose heavier demands on the sewerage system and existing facilities would become obsolete if this Inflow / Infiltration were allowed to continue.

As no engineering report has been developed for this operation as of this time an estimate of the costs involved can be based on the following unit costs:

- | | |
|---|------------------|
| 1. Engineer's Report | \$15,000.00 |
| 2. Sewer Line Cleaning | \$0.35 per foot |
| 3. T.V. Inspection | \$0.40 per foot |
| 4. Testing and Chemical Grouting
of Joints | \$3.90 per foot |
| 5. Plastic Relining | \$10.00 per foot |
| 6. Sewer Line Reconstruction | \$15.00 per foot |

7. Manhole Costruction \$500.00 each
8. Storm Sewer Construction no estimate
(if required)

Investigation and location of sources would require at least a properly equipt 2 man crew. Apply these costs to the 168,000 feet of sewer line and costs in the neighborhood of \$500,000 begin to appear. To capitalize a program of this sort over a period of ten years would require \$50,000 per year.

Summary of Requirements

Operation & Maintainance @\$100,000 / year \$100,000

In Plant Improvements

Clarifiers \$22,500

Clorine Imp. \$ 5,000

Sludge

Phase I \$26,000

Phase II \$50,000

\$103,500 @ 10 years \$ 10,350

Sewer Line Improvements

\$500,000 est @ 10 years \$ 50,000

\$160,350

At the present time it is not anticipated that State or Federal funds will be available.

IV. Rate Structures

General

This section of the report fulfills two requirements. First, it suggests rates that will return revenue of approximately \$160,350.00 . Second, it fulfills the requirement of our NPDES permit, Section G-6 and G-7, which requires an equitable distribution of costs of sewerage treatment.

It would seem that the appropriate way to capitalize the improvements to the plant and the Inflow/ Infiltration program would be through the sewerage service charge. It gives more flexibility to use funds in the sense that the plant improvements are unit costs that will probably appear in the next few years. The City would have the discretion to divert Infiltration funds to pay for these items at the time of construction thus saving bonding and interest costs. In later years, when the Infiltration program is well under way, the in-plant improvement revenue could be directed for this purpose. Probably a more important reason for financing the Infiltration program this way is that it is a maintenance type of operation. Estimates can be made on the overall cost of the program, but until work actually begins on each length of sewer line no true dollar amount can be placed on the work required. Bonding would tie the City to a certain dollar amount spent at specified times and might be too much or might not accomplish all the work that is required.

Residential and Commercial Rates

The residential and commercial rates in the City are based on the single family dwelling or multiples thereof. For example a lodge or private club is considered to contribute $2\frac{1}{2}$ times the single family rate. Most cities have a rate

Residential and Commercial Rates (cont.)

breakdown of this type. This report suggests a 33.3% increase in these rates as shown, in general, in the following table. This would provide approximately \$11,738.85 per month or \$140,866.20 per year.

Industrial Rates

Industrial rates in the City are broken down into three classes to reflect the three types of situations that occur with industrial sewerage.

Class I

A high strength sewerage requiring plant capacity above average in the form of BOD or Suspended Solids. They are billed on: Flow - \$/ million gallons; BOD \$/ pound and Suspended Solids \$/ pound.

Class II

A high water user type of industry, for example water used for cooling and then discharged into the sewerage system. The strength of the sewerage is not above normal domestic sewerage. They are billed on flow - \$ / million gallons.

Class III

This category is reserved for industries that don't discharge process or cooling water. Their rate are handled like domestic or commercial rates and for that reason will not be discussed further in this chapter. For the sewerage rate for this type of industry please refer to the proposed ordinance change.

This type of rate schedule is required by the Federal Government for the equitable distribution of costs.

Unit Costs

In order to arrive at equitable unit costs (\$ / mg, \$ / lb. BOD, \$ / lb. Suspended Solids) it is first necessary to assign various items of the Operations and Maintenance budget, along with improvements to Flow or BOD or Suspended Solids. Mr. Jerry Boyle of CH₂M who is the designer of the present plant was retained to arrive at an equitable cost breakdown. This was applied to the

Unit Costs (cont.)

1974 / 75 Operation and Maintenance Budget and the recommended improvements as shown on the following table. This gives a cost breakdown as follows:

Flow	\$91,414.50
BOD	\$43,901.75
Suspended Solids	\$24,313.75

The next step is to apply these costs to the total yearly flow, BOD and Suspended Solids at the sewerage treatment plant

The unit costs are as follows:

Flow	$\frac{\$91,414.50}{449.54 \text{ mg/yr}}$	=	\$203.35 per mg
BOD	$\frac{\$43,901.75}{797,999 \text{ lb/yr}}$	=	\$0.055 per pound
SS	$\frac{\$24,313.75}{399,710 \text{ lb/yr}}$	=	\$0.06 per pound

These are the suggested rates for the Class I industries. For Class II industries with sewerage strength below the domestic sewerage strength, only the flow cost would apply. At present all Class I industries are metered and sampled so that these rates can be put into effect. It would be inappropriate to suggest a monthly revenue figure derived from receipts of industrial sewerage because of the seasonal operations. A yearly figure of approximately \$10,000.00 would seem reasonable using the 1973/74 industrial sewerage tests and meter readings.

COST DISTRIBUTION

Operation and Maintainance

Item	Flow	BOD	SS
Power	\$6,387.50 35%	\$11,862.50 65%	--
Clorine	\$4,125.00 100%	--	--
Labor	\$30,902.00 40%	\$27,039.25 35%	\$19,313.75 25%
Subtotal	\$41,414.50 41.569%	\$38,901.75 39.04%	\$19,313.75 19.386%
Total - Operation and Maintainance - \$99,629.50			

In Plant Improvements

	\$5,000.00	\$5,000.00
	50%	50%
Total - Plant Improvements - \$10,000.00		

Sewer Line Improvements

	\$50,000.00
	100%
Total - Sewer Line Improvements - \$50,000.00	

Total	\$91,414.50	\$43,901.75	\$24,313.75
	57.26%	27.50%	15.23%
Total - All items \$159,630.00			

At:

449.54 mg/yr	\$203.35 per mg (flow)
797,999 lb/yr	\$0.055 per lb. (BOD)
399,710 lb/yr	\$0.060 per lb. (Suspended Solids)

Allen Fruit

Month

Year

0.4 mg/month

→ \$ 81.34

2500 mg/l BOD

→ \$ 458.70

134 mg/l SS

→ \$ 26.82

\$ 566.86

\$ 6,802.32

Protein Products

0.2 mg/month

→ \$ 40.67

2238 mg/l BOD

→ \$ 205.31

687 mg/l SS

→ \$ 68.75

\$ 314.73

\$ 3,776.76

Residential
& Commercial

11,738.85

\$ 140,866.2

\$ 151,445.28

\$ 60.00

Neo

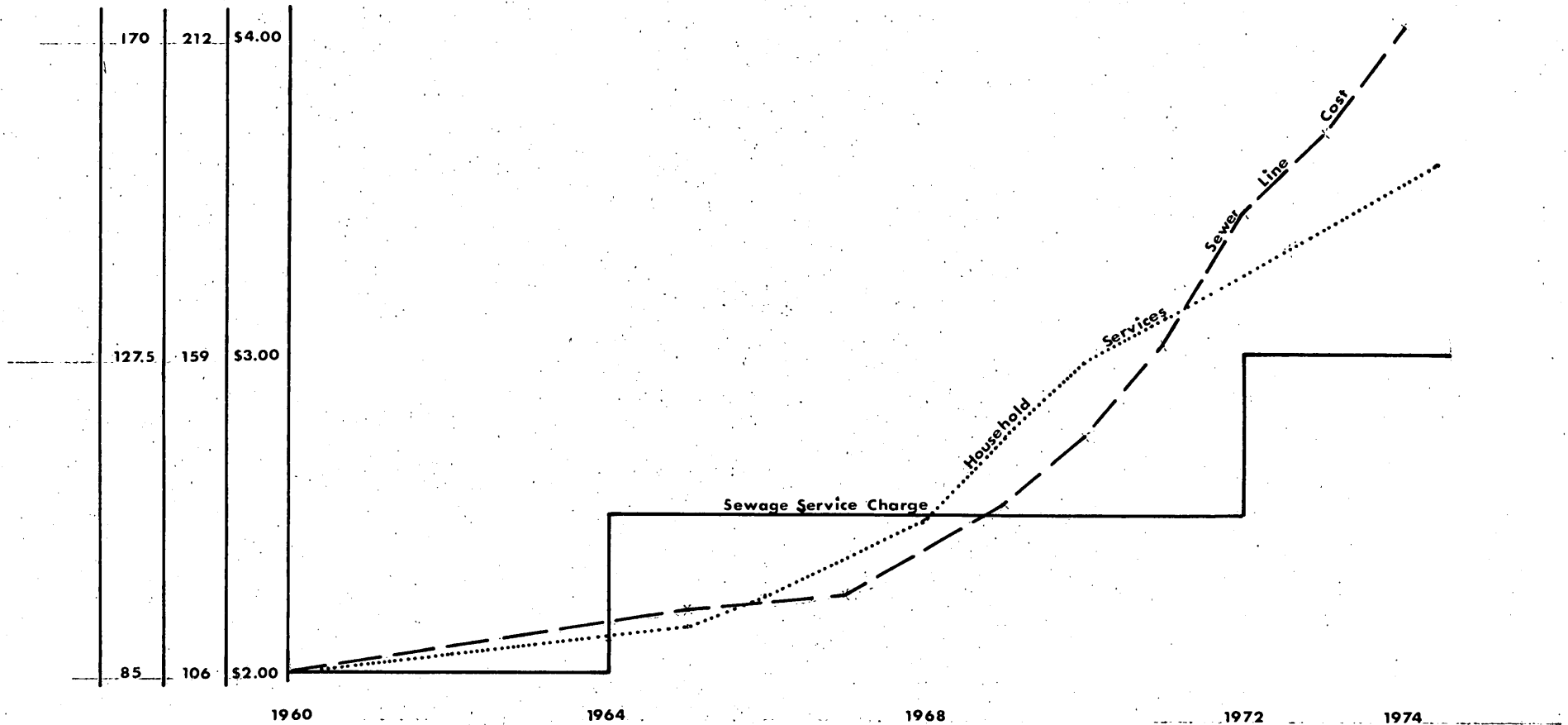
City of Newberg

Sewage Treatment Summary

1973-74

Month	Flow mg/mo.	BOD lbs	S.S lbs
JULY '73	22.27	69,277	39,746
AUGUST '73	21.57	73,567	28,783
SEPTEMBER '73	22.55	60,181	23,320
OCTOBER '73	24.00	61,649	29,823
NOVEMBER '73	51.00	68,054	57,846
DECEMBER '73	56.01	76,141	25,691
JANUARY '74	53.32	133,851	31,566
FEBUARY '74	47.83	49,463	41,884
MARCH '74	57.57	42,731	30,248
APRIL '74	41.58	36,064	29,822
MAY '74	28.19	59,951	35,735
JUNE '74	23.65	67,061	25,246
TOTAL	449.54	797,999	399,710
DAILY AVG.	1.23	2,186	1,095

References: City of Newberg Sewage Service Charge
 Sewer Line Cost; Engineering News-Record
 20 Jun 74 1957-59 = 100
 Household Services; "The American
 Almanac" 1973 1967 = 100



PROTEIN PRODUCTS

AUGUST AVERAGE BOD 2420 ppm

AVERAGE SS 969 ppm

FLOW METER - AVERAGE FLOW 5550 GAL PER DAY

ALLEN FRUIT

AUGUST AVERAGE BOD 2415 ppm

AVERAGE SS 131 ppm

ALLEN FRUIT DID NOT OPERATE DURING THE
MONTH OF AUGUST. FIGURES SHOWN ARE THE
LAST EIGHT SAMPLES TESTED.

CITY OF NEWBERG

PRESENT AND PROPOSED SEWER RATES

Type	Units	Present Service Charge*	Amount	Proposed Service Charge*	Amount
Single Family	1615	\$3.00	\$4845.00	\$4.00	\$6460.00
Duplex	88	\$3.00	\$ 264.00	\$4.00	\$ 352.00
Apartments	529	\$2.10	\$1110.90	\$2.80	\$1481.20
Hotel/Rm. House	64	\$0.60	\$ 38.40	\$0.80	\$ 51.20
Trailer Court	193	\$2.10	\$ 405.30	\$2.80	\$ 540.40
Motel	22	\$1.50	\$ 33.00	\$2.00	\$ 44.00
Commercial Laundry	1	\$36.00	\$ 36.00	\$48.00	\$ 48.00
Dry Cleaner	2	\$6.00	\$ 12.00	\$8.00	\$ 16.00
Food Service (A)	0				
(B)	9	\$7.50	\$ 67.50	\$10.00	\$ 90.00
(C)	2	\$15.00	\$ 30.00	\$20.00	\$ 40.00
Auto Establishment	19	\$6.00	\$ 114.00	\$8.00	\$ 152.00
Lodge/Private Club	4	\$7.50	\$ 30.00	\$10.00	\$ 40.00
Retail Food Store(A)	2	\$3.00	\$ 6.00	\$4.00	\$ 8.00
(B)	2	\$7.25	\$ 14.50	\$9.70	\$ 19.40
(E)	2	\$24.00	\$ 48.00	\$32.00	\$ 64.00
Bowling Alley (lanes)	12	\$0.75	\$ 9.00	\$1.00	\$ 12.00
Business (one tent.)	60	\$3.00	\$ 180.00	\$4.00	\$ 240.00
Business(two or more)	47	\$2.10	\$ 98.70	\$2.80	\$ 131.60
Banks, Dr. Office, etc	18		\$ 58.20		\$ 77.60
Sub total			\$7400.50		\$9867.40
Special Accounts			\$1523.55		\$1871.45
TOTAL			\$8924.05		\$11,738.85

*Sewer rates figured on a per month basis.



CORNELL, HOWLAND, HAYES & MERRYFIELD

1600 S. W. Western Blvd., P.O. Box 428, Corvallis, Oregon 97330, Telephone: 503/752-4271

Corvallis Regional Office

Cable: CH2M-CVO

24 May 1974

C8540.0

City of Newberg
City Hall
Newberg, Oregon 97132

Attention: Mr. George Hall
City Engineer

Gentlemen:

Subject: Aerobically Digested Sludge Disposal

This report comprises Tasks 2 as originally outlined in our letter of January 23, 1974. Task 2 consisted of a review of the existing sludge disposal facilities and the investigation of improved disposal solutions.

The first step of Task 2 was to investigate the existing lagoon problems and practices. Currently, the practice is to waste 10,000 to 15,000 gallons of sludge every two to three weeks by pumping to one existing sludge lagoon below the treatment plant. With a dike elevation of approximately 75 feet, plant datum, this lagoon is subject to frequent flooding by the Willamette River. From the Corps of Engineer's Flood Plain Data, the 20-year flood elevation is apparently 91.00 feet; therefore, flooding of the existing sludge lagoon is an annual possibility. To provide protection with a minimum 20-year flood interval, the existing lagoon dike would require an additional 15 feet of fill.

At present, there is no means nor practice of removing each year's accumulation of sludge from the lagoon. The periodic flooding of the Willamette River removes the sludge from the present lagoon. It would be both expensive and difficult to construct a decant return and sludge withdrawal system for the existing lagoon to allow the sludge to dry to a consistency suitable for removal and final disposal. Additionally, there would be limited flood protection even with a greatly increased dike height.

The ultimate sludge disposal should be returned to the land as fertilizer or a soil conditioner. Plant nutrients such as Nitrogen, Phosphorus, Potassium, etc. contained in the sludge can be recycled to the land with minimal environmental impact. Land application of organic solids provides a net benefit to the environment, while other sludge disposal methods do not

provide comparable environmental benefits. Furthermore, land application systems limit the commitment of irretrievable natural resources such as electrical power and natural gas, while the value of the organic solids as a resource is retained. Besides the numerous nutrients available, the humus in the sludge conditions the soil, improving its moisture retentiveness.

Aerobic waste activated sludge contains more nitrogen and therefore has a greater fertilizer value than anaerobic sludge. Farmers that are using anaerobic sludge as a soil conditioner should be receptive to using aerobic sludge. However, mixing of the two sludges should be avoided to minimize the possibilities of creating odors.

Since it is not possible to have access to farm fields during the wet weather period, capability to store sludge is necessary. The estimated storage period is November through April, with the accumulated sludge then hauled to the fields for spreading during dry weather.

A review of the design calculations for the aerobic digester indicated that at the design flow for the existing plant, 990 pounds of dry solids would be wasted per day. This quantity was verified and the current wasting quantity calculated. From information derived from the operators, dry solids wasted varies from 85 pounds per day to 112 pounds per day. The current practice requires a storage volume of approximately 24,000 cubic feet for a six month period. A maximum six month storage volume of 92,500 cubic feet would be required for the designed solids wasting of 990 pounds per day. For these storage volumes there is no feasible on-site solutions.

Drying or dewatering of the sludge is very important for economical considerations. The quantities to be hauled to the land disposal site may be reduced by as much as 80% to 90% with drying. This is the controlling factor in sizing the lagoons to meet the current need. Additionally, it is the reason to provide mechanical dewatering capabilities when the sludge depth becomes too great to dry during the dry weather period. At the current wasting rate, only seven truckloads per six month period (5 cu. yd. / truck) would result if the sludge was dried to 35% to 40% solids. Concentrated to only 3% solids, 76 truckloads would result.

The following were considered as possible sludge disposal solutions:

1. Mechanical Sludge Dewatering

There are many sludge dewatering systems on the market and most would do an adequate job. The Permutit Company markets a dual cell gravity concentrator that would be relatively easy to operate and would be dependable. Such a system could greatly reduce the sludge volume to be wasted. Primarily the main handicap of this type of system would be the lack of a storage capability. The dewatering equipment could be located on the existing plant site, but during the wet weather period a storage location would be needed. The above assumes ultimate sludge disposal to be spreading on farm land.

2. Drying Lagoons and Sand Drying Beds

Both systems would require additional land to be purchased by the city. Figure 1 shows possible locations near the existing plant. For effective use, the sludge depth should be limited to approximately one foot, so that drying may be accomplished in a reasonable amount of time. In either system there would be adequate storage capability, but increased land cost over the previous solution. They would also be easier to operate than a mechanical system, although both include mechanical removal of dried sludge. A sand drying bed is expensive when compared to other solutions.

3. Storage Lagoon with Mechanical Dewatering

This solution would allow decreased land usage with greater storage capabilities. Sludge would be stored at greater depths, then dewatered by mechanical means. Lagoon costs would decrease, but equipment costs and operational needs would increase. This system would also require an off-site location as shown on figure 1, site No. 3. Final disposal would again be land disposal.

DISCUSSION

In reviewing the city's current needs and considering the possible future loadings, a combination of the possible sludge disposal solutions would seem best. The immediate concern is to find an alternate to the present disposal system with a minimum of expense and construction time. This system should also be readily adaptable for a future disposal system with

a greatly increased capacity. From the alternatives previously mentioned, the one that could fulfill both the present need and have a tremendous future expansion capability, would be drying lagoons of adequate depth to hold future plant design sludge volumes as storage lagoons. A mechanical dewatering capability would be required for sludge drying when the lagoons were used for storage. Construction and use of the sludge disposal facilities could be a two phased approach, with the first phase satisfying the present needs and the second phase providing reserve capacity for the future.

Phase one would consist of construction of the lagoons and their use as drying lagoons only. Adequate depth would be provided to contain the expected design maximum volume of 92,500 cubic feet, additionally the surface area would serve the present requirements of a drying bed with a maximum sludge depth of one foot. Two lagoons would be constructed with each having sufficient surface area to serve the present needs individually. Initially, only one lagoon might be constructed; however, sludge discharge during the lagoon's drying period would not be possible.

Sludge pumped to the lagoon from the Aerobic Digester would thicken to 3% to 4% solids. Rain water and supernatant would be removed by a weir and stopgate outlet structure and returned to the treatment plant headworks. A scum baffle would prevent scum from being discharged with the supernatant. During dry weather, the sludge would be removed for final disposal on the land. Currently, approximately 50 to 60 1,500 gallon tank truckloads would be required to empty the lagoon, if the sludge was not allowed to dry or the sludge depth was too great for much drying to occur. However, if the sludge depth was restricted to 12 inches and the sludge allowed to dry to 35% to 40% solids after draining the supernatant, approximately 60 days drying time, the number of truckloads would be greatly reduced and the solids could be handled as a moist cake.

Phase two, completed when necessary for increased sludge volumes, would include a mechanical sludge dewatering facility. The lagoons would be used for storage only, with sludge depths such that the drying time required would greatly exceed that available in the Willamette Valley during the dry weather period. Therefore, any reduction in sludge volume for land application would require mechanical dewatering.

The dewatering equipment would be housed in a building immediately adjacent to the lagoons with both good access to the decant line from the lagoons and adequate roads for sludge hauling trucks. The decant line would perform as a lagoon dewatering suction line after the stopgates in the outlet structure were removed.

Table 1 indicates the approximate cost of this phased approach. The immediate expense of \$26,000 for this disposal method is lower than alternate systems which include complete flood protection and flexibility for future design loads. Also the City is not limited to one disposal system for the future. Figure 2 shows a preliminary layout of the drying lagoons for one of the sites available. Figure 3 gives a more detailed view of the lagoon inlet and outlet control structures.

RECOMMENDATIONS AND OPERATING PLAN

It is recommended that the City purchase additional land, as shown in Figure 1, site No. 1, immediately above the plant site and construct two lagoons as shown in Figure 2. For the present needs these lagoons would function as drying lagoons with the sludge depth being limited to one foot. Later use with increased sludge wasting would allow deeper sludge depths and mechanical dewatering. Current expenditures would be kept to a minimum, while increased loads in the future could be handled with minimal additional expenditures.

The site selection was governed by two considerations; first, the required available land for the lagoons plus easy access for dried sludge hauling trucks, secondly, the limited head capability of the existing waste sludge pump. Using this site location, the existing Marlow Simplex Plunger pump could possibly be adequate in its present configuration. At most, the pump would only need to be modified by increasing the motor size from 2 hp to 5 hp.

Another consideration justifying this location, is the necessity of returning decanted rainwater from the lagoons to the treatment plant. Utilizing this location, there would be no pumping requirements. The lagoons would also be available for daily inspection.

Possible problems with odors have been investigated. Properly run lagoons should produce very little odor. There may be a slight musky odor for a few hours when the lagoon is first

City of Newberg
24 May 1974
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C8540.0

dewatered for sludge drying. However, this is usually not offensive and of very short duration. Odors can become a problem, if sludge that is not fully digested is wasted. With the current practice, this does not seem to constitute a problem.

If you have any questions regarding this proposal, I would be happy to discuss them with you at your convenience.

Very truly yours,

Richard A. Fornelli

Richard A. Fornelli

kvb

TABLE 1
COST ESTIMATE

PROPOSED DISPOSAL SYSTEM

PHASE ONE

ADDITIONAL LAND	\$ 6,000
EARTHWORK (2 LAGOONS, 5' DEEP)	11,260
CONTROL STRUCTURES	2,000
PIPING	5,250
MISCELLANEOUS	1,490
TOTAL	<u>\$26,000</u>

PHASE TWO

DEWATERING EQUIPMENT	\$30,000
INSTALLATION	7,500
CONVEYORS	4,500
BUILDING	8,000
TOTAL	<u>\$50,000</u>

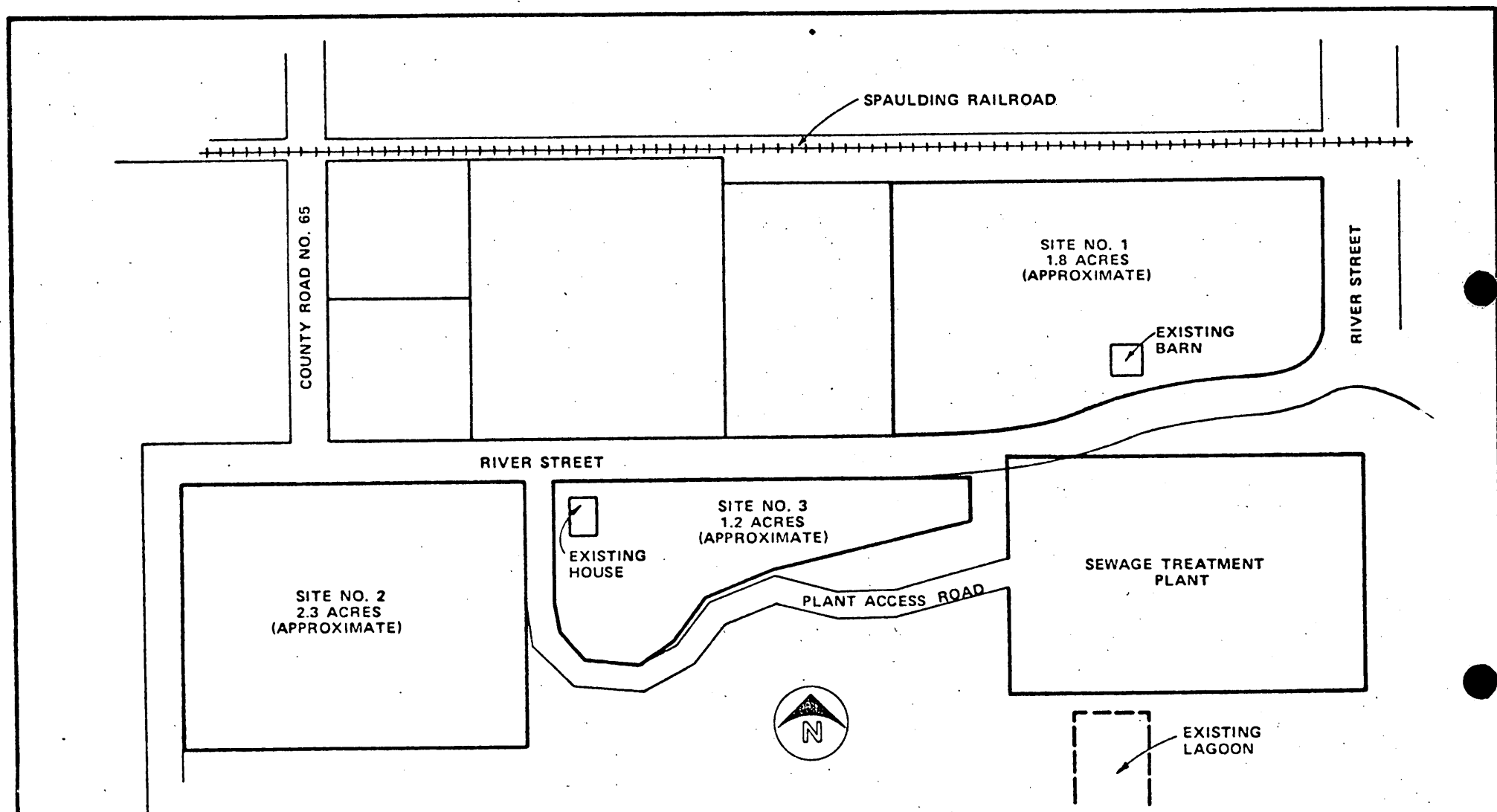


FIGURE 1
POTENTIAL LAGOON SITES

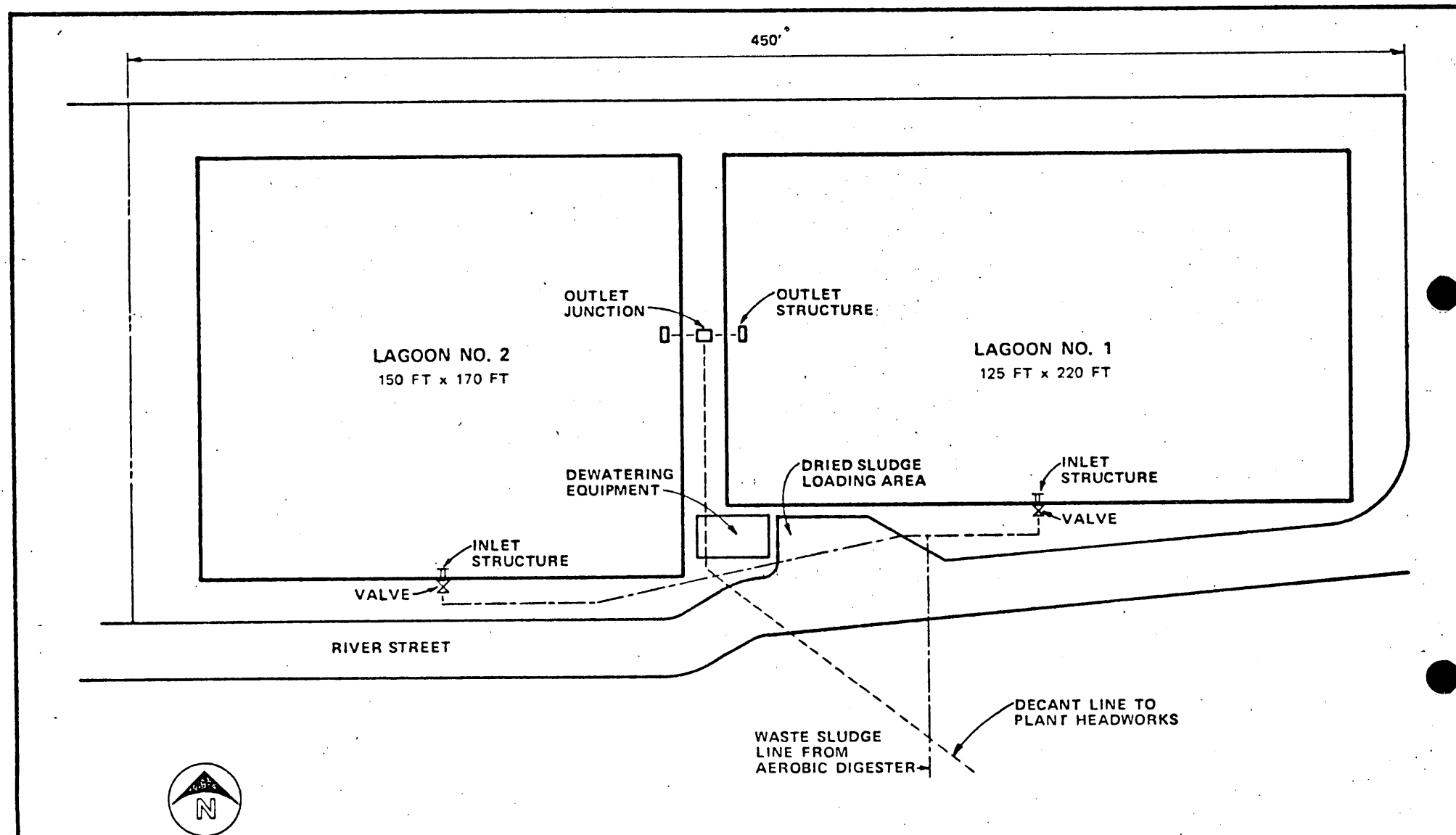
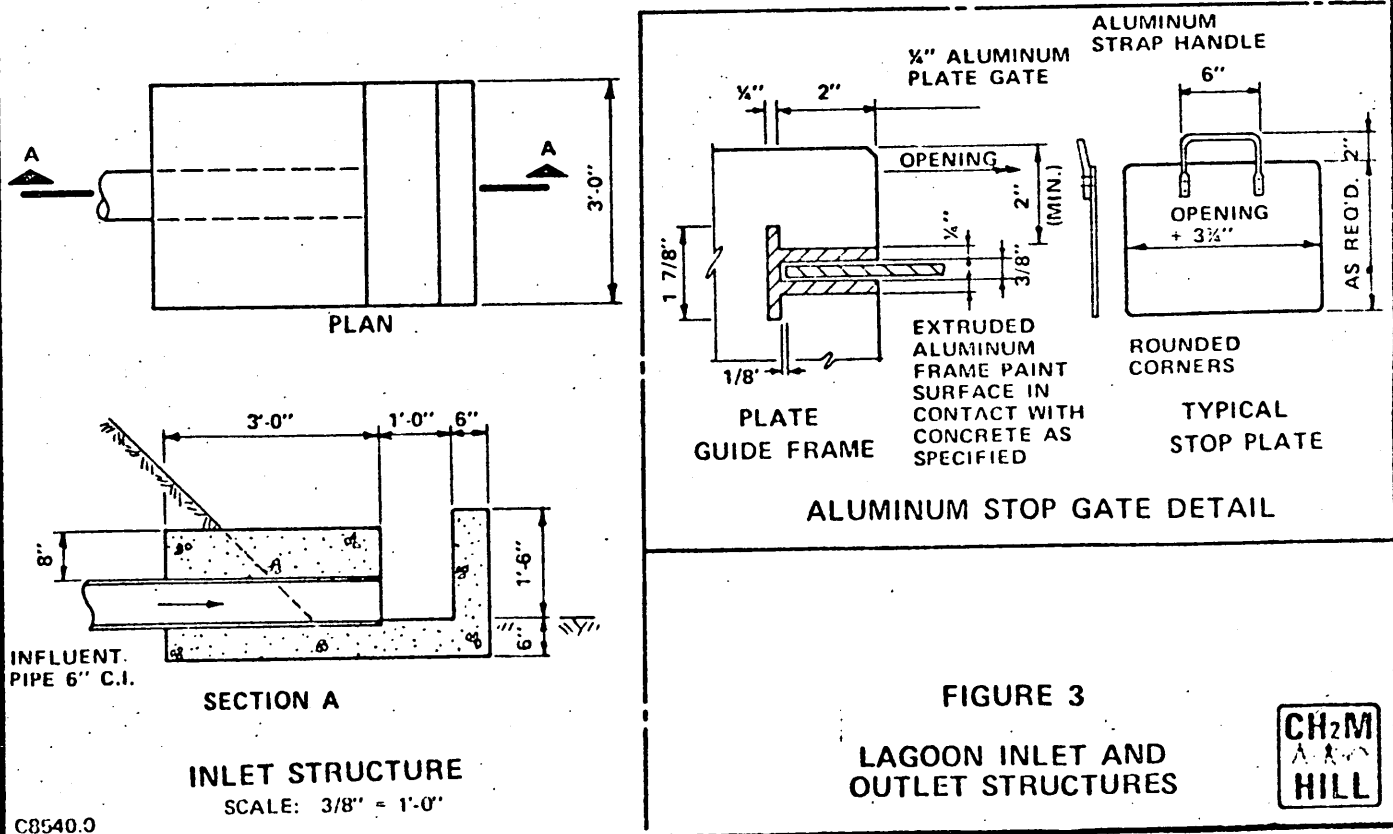
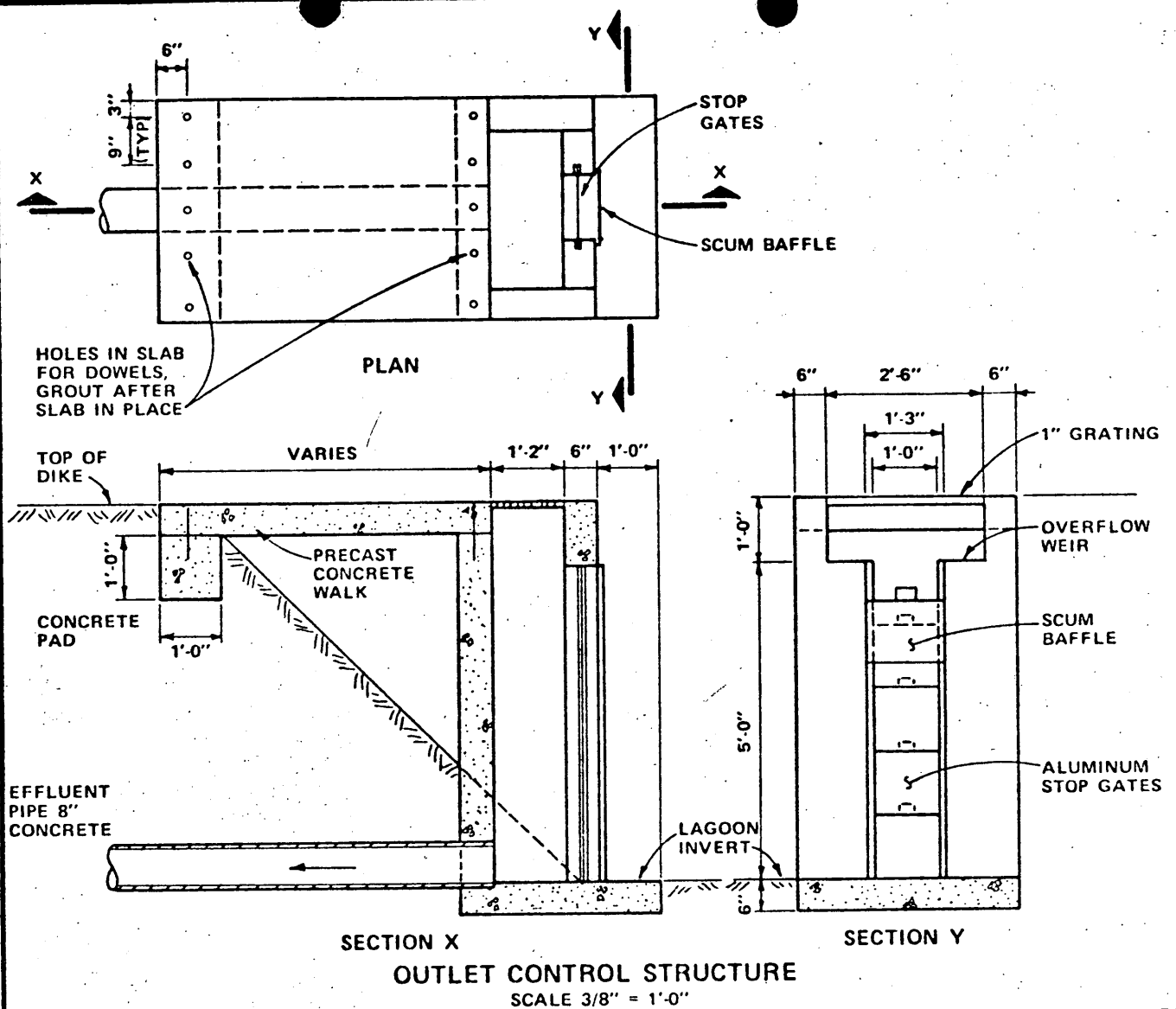


FIGURE 2
 DRYING LAGOONS WITH MECHANICAL
 DEWATERING EQUIPMENT





CORNELL, HOWLAND, HAYES & MERRYFIELD

1600 S. W. Western Blvd., P.O. Box 428, Corvallis, Oregon 97330, Telephone: 503/752-4271

Corvallis Regional Office

Cable: CH2M CVO

22 March 1974

Project No. C8540.0

City of Newberg
City Hall
Newberg, OR 97132

Attention: Mr. George Hall
City Engineer

Subject: Sewage Plant Improvements

Dear Mr. Hall:

This is in regard to our letter of January 23, 1974 for Task 1, "In-plant Improvements", as suggested by the DEQ. Task 2 will be in a separate report submitted at a later date.

Task 1 included the investigation of dewatering and cleaning the chlorine contact chambers, plus scum removal from the final clarifiers. Preliminary layouts of these improvements are provided in Figures 1 through 3. Following are proposed improvements:

CHLORINE CONTACT CHAMBERS

We propose that both chambers be dewatered by a portable pump with a rated capacity of approximately 250 to 300 GPM, such as a Peabody Barnes 20 M Model 26 CCG 3. This would permit both contact chambers to be cleaned and dewatered in a single 8-hour shift. The portable pump would also be available for city use when not required for dewatering purposes.

Chlorine Contact Chamber No. 1 would be dewatered by closing gate C-5 and pumping the contents directly to primary clarifier No. 2 as shown in Figure 1. Since the chamber is an open basin, the solids could be dislodged and mixed by a hand operated water hose connected to the scum spray pump on secondary clarifier No. 1.

By discharging directly to the primary clarifier, solids from the contact chamber would be removed by both the primary and secondary clarifiers.

Chlorine contact chamber No. 2 would be dewatered by pumping the contents from upstream of the final weir to the clarifier influent box. The new gates installed as shown in Figure 2 would divert the clarifier effluent to chlorine contact chamber No. 1. By opening gates C-4 and G-1, the flow can be routed through the effluent box of clarifier No. 1.

A new header and spray nozzle system in the chlorine contact chamber, as shown in Figure 2, would wash the solids to the pump intake. This spray system would use the same pump as the scum skimming spray system. Discharging the wash water to the clarifier influent, would provide removal of solids before final discharge to the outfall. Cleaning chlorine contact chamber No. 1 after No. 2 would further limit the amount of solids going to the outfall during cleaning operations. Any solids passing secondary clarifier No. 2 and settling in chlorine contact chamber No. 1 would be returned to the primary clarifiers during cleaning.

SECONDARY CLARIFIER SCUM SKIMMING

This system, Figure 3, would incorporate a header with spray nozzles and a telescoping valve to remove scum. Scum baffles would be placed inside the weir plates on both clarifiers. Scum forming on the clarifier would be driven around the surface to a draw off point by an arrangement of spray nozzles. Spray water would be provided by a submersible pump in the clarifier effluent box. This pump could also serve the chlorine contact chamber wash down system with proper sizing of the two headers to attain similar head loss in both systems. In the case of scum spray pump No. 1, a hose connection would be provided for wash down of chlorine contact chamber No. 1.

Telescoping valves, with manual control, would control the amount of scum drawoff from each clarifier. A platform would be required to allow operators access to these valves. Both valves would discharge to a common scum pit where another submersible pump, controlled by float switches, would pump the scum to the primary clarifier influent channel. This would avoid a build-up of scum in the secondary plant and allow scum to be removed by the existing facilities in the primary plant.

In reviewing a similar design of scum removal completed for Albany, a preliminary cost estimate, Table 1, of \$22,500 would include scum baffles, piping, spray pumps, scum pump, operators platform, plus

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the cost of installation. An additional \$5,000 is estimated for the cleaning and dewatering of the chlorine contact chambers. Therefore, the total construction cost of the in-plant improvements would be slightly under \$30,000. This estimate does not include design engineering costs. If the construction could be accomplished by city forces the cost could be reduced somewhat.

If you have any questions about anything in this letter, please contact me.

Very truly yours,

Richard A. Fornelli
Richard A. Fornelli

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TABLE 1
COST ESTIMATE

SCUM REMOVAL SYSTEM

BAFFLES	\$ 4,500
PIPING	5,500
SPRAY PUMPS	2,100
SCUM PIT	7,000
PLATFORM	1,300
OTHER	<u>2,100</u>
TOTAL	\$22,500

CHLORINE CHAMBER DEWATERING AND WASHING

PIPING	\$ 3,350
PORTABLE PUMP	1,400
SLUICE GATES	<u>250</u>
TOTAL	\$ 5,000

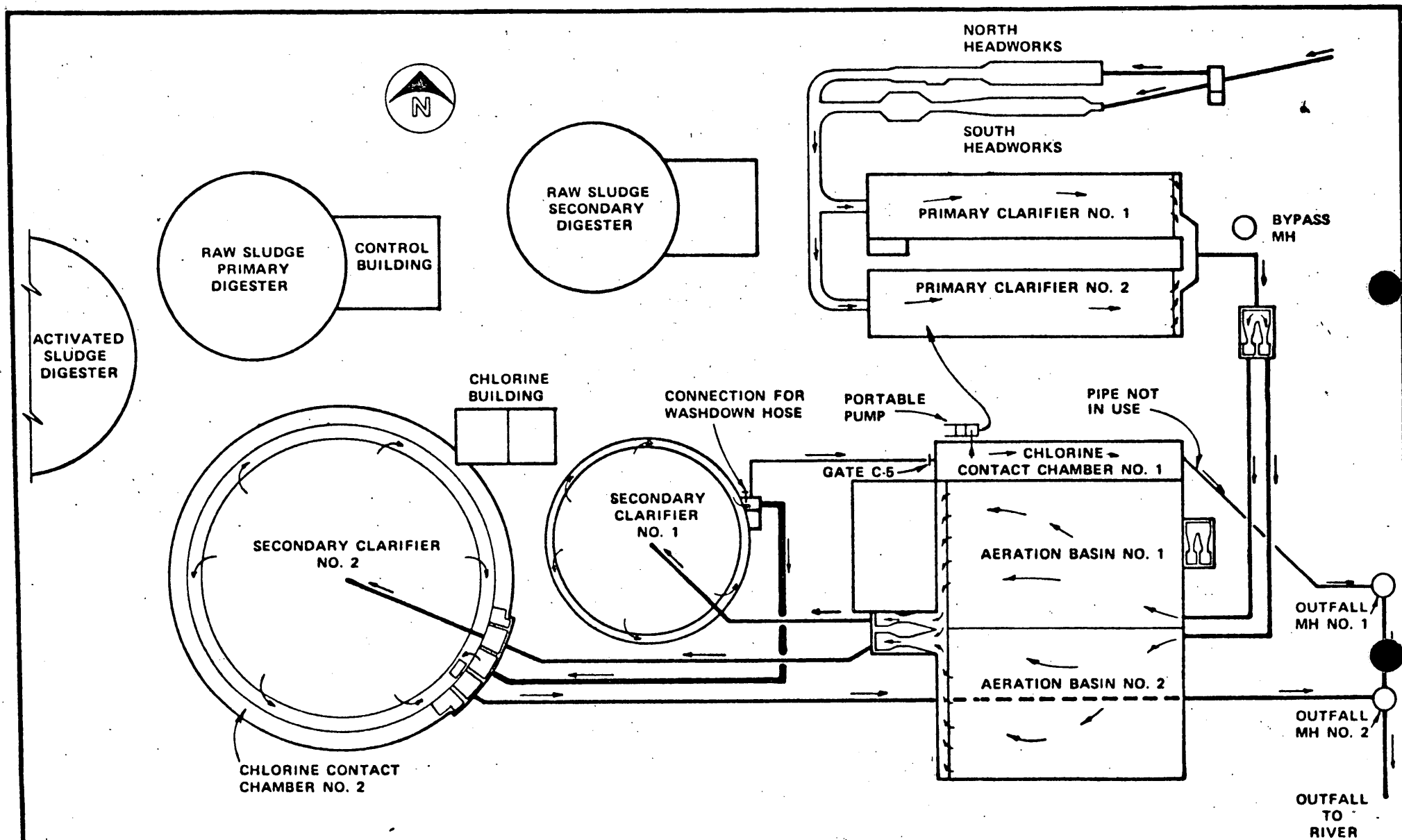


FIGURE 1
DEWATERING AND CLEANING CHLORINE
CONTACT CHAMBER NO. 1

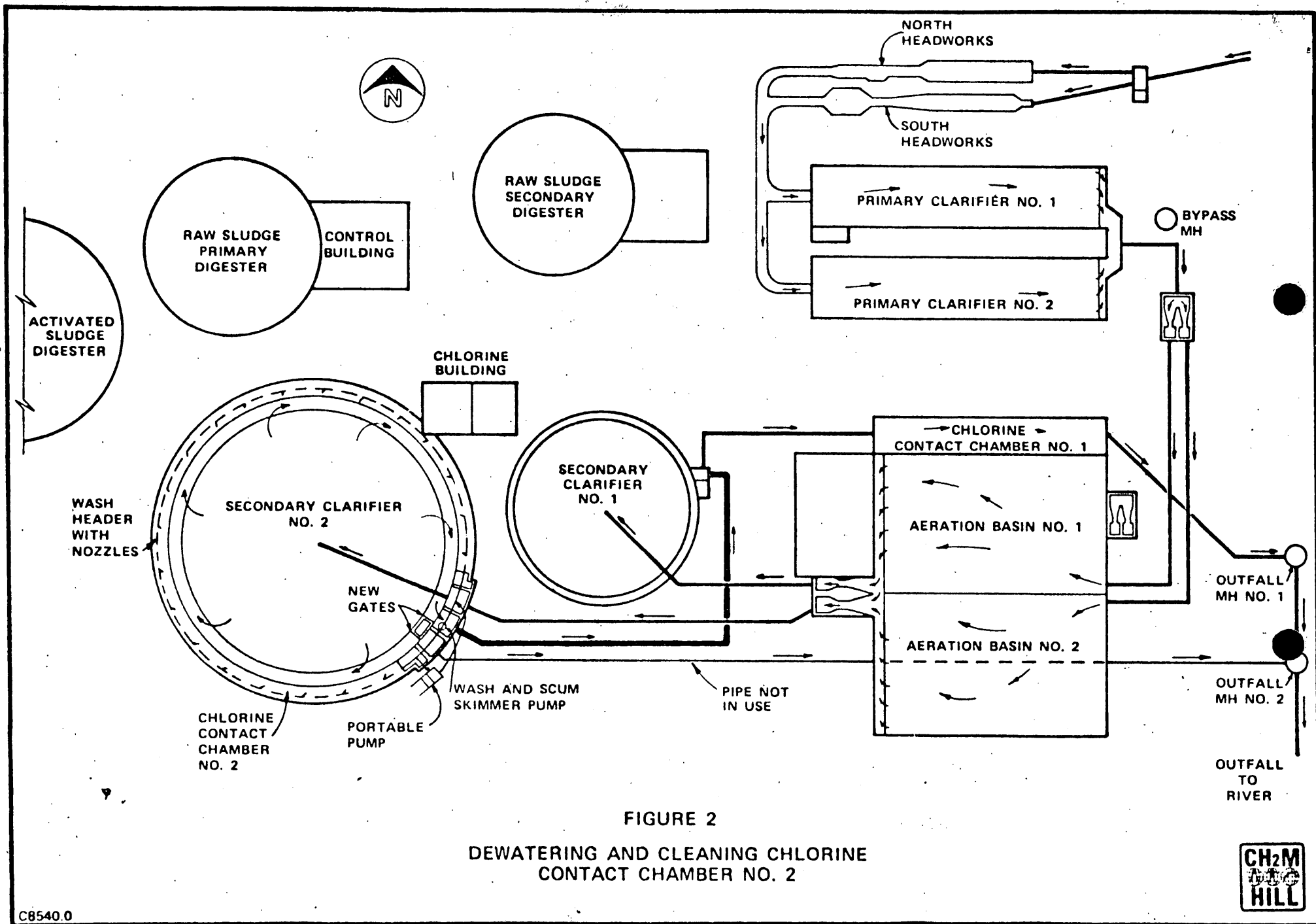


FIGURE 2

DEWATERING AND CLEANING CHLORINE
CONTACT CHAMBER NO. 2

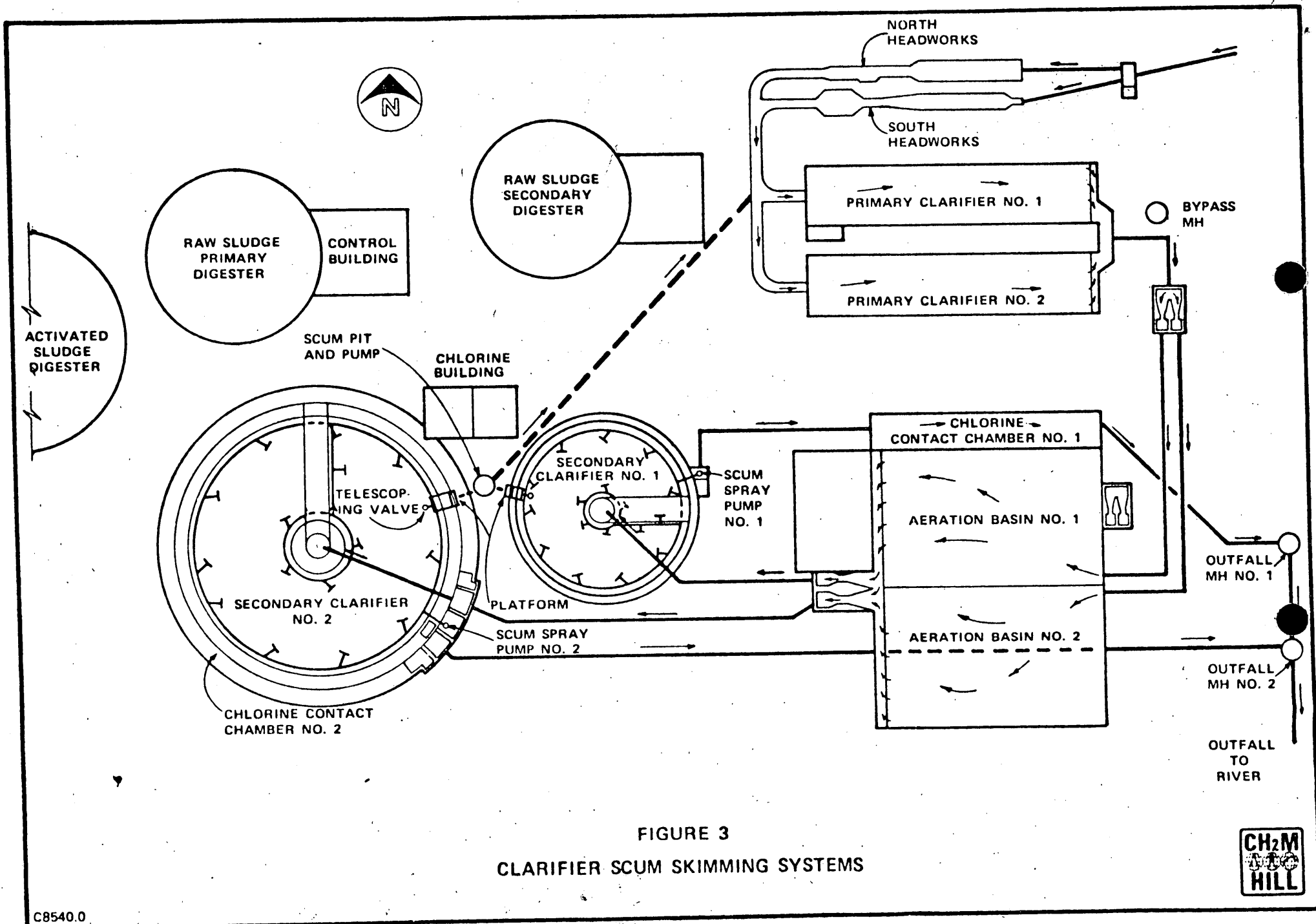


FIGURE 3
CLARIFIER SCUM SKIMMING SYSTEMS