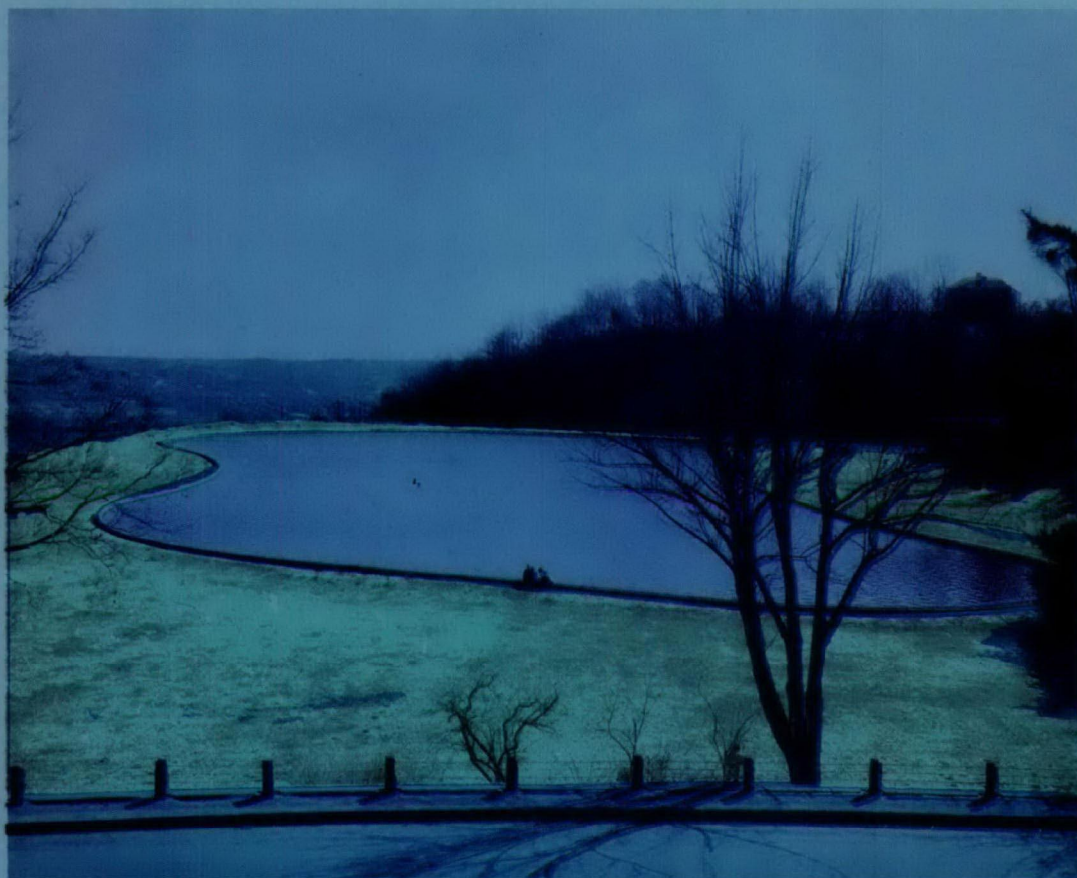


AESTHETIC RESERVOIR COVERS



ENVIRONMENTAL PROTECTION AGENCY
WATER HYGIENE PROGRAM
REGION IX
SAN FRANCISCO, CALIFORNIA

-- 1971 --

"The esthetic possibilities of water-works properties have been recognized by many cities and companies and achieved in varying degrees by a number It is obvious that beautiful surroundings add enormously to the value of the plant (and property) and especially is this true in the eyes of the public."¹

COVER: Eden Park Reservoir, Cincinnati, Ohio

¹"Water Works Practice", Manual American Water Works Association, 1925.



ACKNOWLEDGEMENT

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AESTHETIC RESERVOIR COVERS

Once water officials are convinced of the need to cover finished water reservoirs, they in turn must convince City officials and the general public. In areas where residents have grown accustomed to viewing a beautiful lake, there is naturally some reluctance to lose this pleasure by having it replaced by concrete and building materials. East Bay Municipal Utilities District's (EBMUD, Oakland, California) approach to a final cover design is to have the affected neighborhood form a committee and select one of from up to three proposed designs. EBMUD calls this program its "Good Neighbor Policy of Community Esthetics." Along with a unique cover design, the utility provides landscaping and finishing materials which blend with surroundings.

The following material is presented as examples of reservoir covers which were constructed (or are proposed for construction) in residential areas so as not to distract from the surroundings once enjoyed by the neighborhood. The idea is to supplement the basic cover with materials which make the roof as attractive as possible.

The intent of this information is not one of showing the need for covering reservoirs, as this is discussed in depth in various sources; however, it might be appropriate to list some of the major reasons why such an extensive program was conducted by EBMUD. (The problems listed here are applicable to most areas where uncovered reservoirs are still existing.)

1. Deterioration of finished water during storage. This deterioration had been both chemical and biological. Some factors were:
 - a. Bacterial -- caused by water fowl, insects, airborne contamination.
 - b. Chemical -- caused by rainfall, leaves, pollen, concentration by evaporation.
2. High maintenance costs
 - a. Algal propagation was evident and required control. This not only created additional maintenance costs but added to the chemical degradation of the finished water.
 - b. Open reservoirs required at least annual cleaning. The list of items found during cleaning was quite lengthy, however it included bottles, cans, newspapers, cash registers, automobile tires, dye markers, prescription bottles, and an occasional telephone booth.

3. Open reservoirs were an attractive nuisance --

Entry to open reservoirs usually went undetected, whereas entry to covered reservoirs is usually noticeable because of broken locks, etc. Since at least one drowning in the open distribution reservoirs was documented, it was reasonable to assume that swimmers would occasionally partake of the tempting aqueous areas.

This program has been costly, but along with general public acceptance, the Utility has reaped the benefits of:

1. Improved water quality.
2. Improved water quality control.
3. Decreased maintenance costs due to a tenfold increase in necessary cleaning intervals.
4. Eliminated costs for algal control and has reduced chlorine demands.
5. One reservoir site has produced an additional recreation area.
6. Water officials are generally relieved by knowing that illegal entry into their distribution reservoirs can now be readily detected, and that their finished drinking water reservoirs are no longer a convenient "dump ground" or swimming pool.

EBMUD's experience with wood preservatives has yielded the following:

1. CREOSOTE treated lumber cannot be used any where in the construction because of ~~taste~~ and odor problems which will result. Creosote treated lumber also supports slime growth.
2. Cellon treated lumber is acceptable because it does not impart taste and odors and will not support bacteriological growths; however, it will support combustion for the first three to four years.

THE FOLLOWING EXAMPLES, TAKEN FROM THE EAST BAY MUNICIPAL WATER DISTRICT, ILLUSTRATE THE PROCEDURE FOR COVERING DISTRIBUTION RESERVOIRS AND SOME OF THE FINAL RESULTS.

SUMMIT RESERVOIR (Present uncovered appearance)

Summit Reservoir (volume 40 million gallons) will be covered in the near future. The proposed appearance, as shown on the next page, incorporates the idea of a mirror (false lake) finish which has been successful in Cincinnati, Ohio (Eden Park Reservoir, shown on cover). This reservoir, because of its location and service area, cannot be taken completely out of service while a cover is being installed. Fortunately, it was originally constructed with a partition which creates two separate sections -- one section will be drained and covered while the other section continues to serve the pressure zone.



MODEL OF PROPOSED SUMMIT RESERVOIR COVER



MODEL OF PIEDMONT RESERVOIR NO. 2

(Presently under construction)

Piedmont Reservoir No. 2 (volume 23 million gallons) was originally an earthen reservoir. The "false lake" concept was incorporated into the design and the following two pages show subsequent stages of construction.



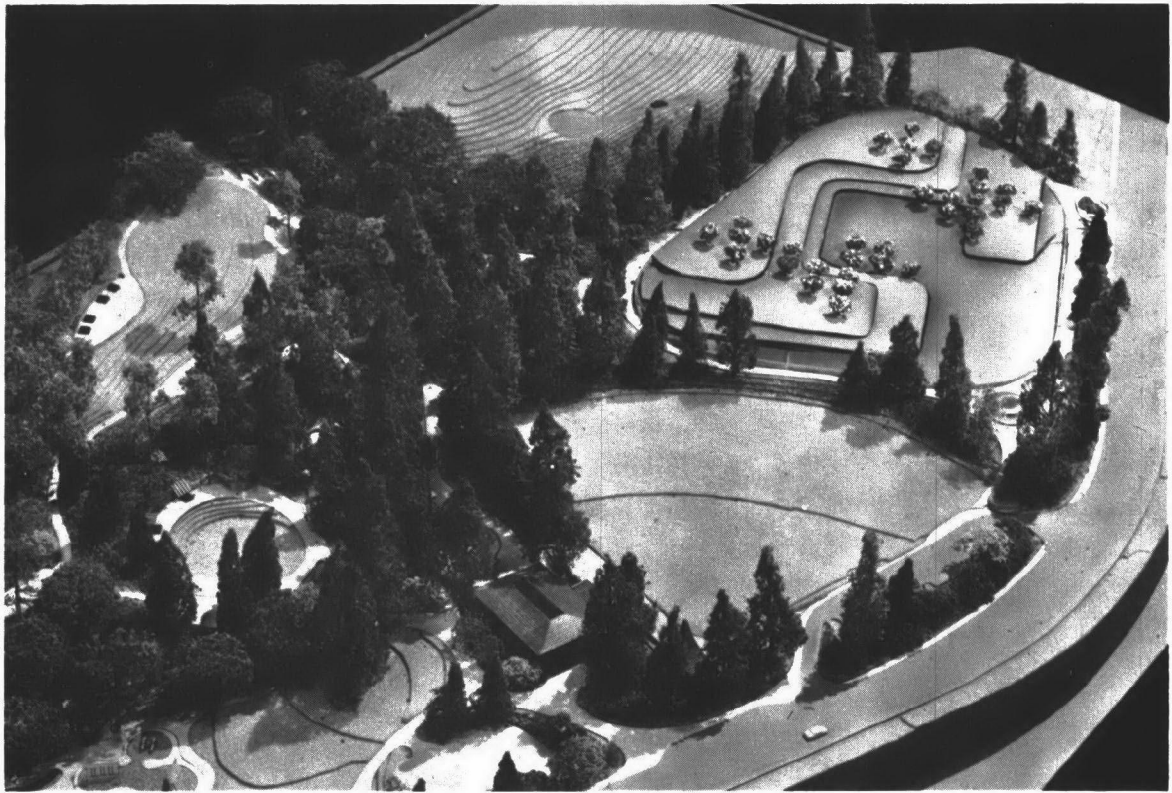
INITIAL LINING STAGES -- JANUARY 1970



PROGRESS TO APRIL 1970

PIEDMONT RESERVOIR NO. 2

PIEDMONT RESERVOIR NO. 2 -- JANUARY 1971



BERRYMAN RESERVOIR (volume 23 million gallons) is shown as the conceptual model (above) and "as built" (below). With the reservoir protected, the adjacent land area provides a recreational site for the neighborhood.

The Estates Reservoir (volume 18 million gallons) has probably, and deservingly, received more national attention than any other reservoir because of its unique and attractive cover. This cover has been well accepted by the neighborhood and, in addition to being mentioned in various trade journals, this reservoir with its roof of contours and fountains, appeared on the cover of the November 1969 issue of "The American City" magazine.

This reservoir is concrete lined and has concrete columns supporting laminated beams. Roofing material is three-fourth inch plywood, constructed in tiers to give a contour appearance and covered with gray river rock and various shades of gravel. The surface area is approximately 3.5 acres. The fountains are operated during the daylight hours by means of a time switch. An over-riding wind-velocity deactivation switch regulates the fountain height as follows:

<u>Fountain Height, Ft.</u>	<u>Wind Velocity, MPH</u>
30 - 35	0 - 8
15 - 20	8 - 15
0	greater than 15

AERIAL VIEW OF ESTATES RESERVOIR

AERIAL VIEW NORTH RESERVOIR

North Reservoir (volume 80 million gallons) was covered with corrugated asbestos in a random pattern to simulate reflected light patterns on water. The surface area of this reservoir is approximately nine acres.