

History of the Sewerage System of the City of Santa Cruz

History

Santa Cruz was originally incorporated as a city in 1866 under a special act of the State Legislature. With the construction of transportation facilities, Santa Cruz became an attraction to tourists because of its fine beaches and beautiful scenery. The San Jose–Capitola Turnpike, constructed about 1870, permitted easier access to the city and encouraged growth. Between 1860 and 1870, population of Santa Cruz increased from 950 to 2,561. By 1880 the population had increased to 3,898.

First Sewerage System

First sewers were laid in Santa Cruz in the 1880s in the Mission Hill area. Sewage flowed from the collection sewers through a ditch into Neary's Lagoon. As other sections of the town developed, additional sewers were laid.

By 1917 the sewerage system had been extended to serve about 75 per cent of the city. The remaining 25 per cent was served by vault privies. The portion of town west of the San Lorenzo River, except for the beach area, was sewered to an outfall discharging to the Pacific Ocean at Woodrow Avenue and West Cliff Drive. Flow to the outfall was by gravity except for that from the business district. Sewage from the business district was pumped to the outfall from a collecting sump located near the site of the present sewage treatment plant. The rest of the town was sewered to several septic tanks which discharged to the San Lorenzo River, to Branciforte Creek, or to Monterey Bay.[1]

Wastes from these systems were carried by river flow and tidal action onto the popular bathing beaches at the mouth of the river.[2]

Quarantine of Mouth of San Lorenzo River

On July 18, 1917 a special report to the California State Board of Health was prepared by the Bureau of Sanitary Engineering. A portion of this report concerning the mouth of the San Lorenzo River is quoted below:

The most serious condition arises from the practice of bathing in the San Lorenzo River from the mouth on upstream a distance of about 1,000 feet. A large sand bar has formed there and the water, being warmer than that of the bay, is preferred by many. A bath house where suits may be rented is operated for the benefit of persons bathing in the river. The natural flow of this stream in the summer is very small and it is the tidewater sweeping back and forth that makes this use of the stream possible. It is this tidewater also that is depended upon to remove the sewage entering the river from nine septic tanks immediately above. Moreover, on the incoming tide the discharge of the East Side sewer at the mouth of the river is naturally swept back over this bathing beach.

This must be recognized as being a serious menace to the public health and the use of the river in Santa Cruz for bathing should be forbidden. It is recommended that the State Board of Health issue an order quarantining the river for bathing purposes at any point within the effect of tidewater and that the local authorities be instructed to enforce the order. Such

a quarantine should continue in effect until improvements are made in the method of sewerage the City that will eliminate the menace.

As a result of this recommendation, the California State Board of Health on August 15, 1917, advised the Santa Cruz City Health Officer to quarantine the San Lorenzo River against bathing for a distance of 1,000 feet above the point where the waters of the San Lorenzo River entered into Monterey Bay....

The mouth of the river remained quarantined until 1928 when the screening plant, interceptor sewers, and outfalls were constructed.

A portion of Monterey Bay beach in Santa Cruz was also quarantined for a short period in 1925 by the State Board of Health because of contamination resulting from discharge of raw sewage in the vicinity.[3]

The city in 1925 retained consulting engineers Charles Gilman Hyde and Walter C. Howe to make a comprehensive study of sewage collection, treatment and disposal. Their study was followed by completion in 1928 of the network of intercepting and trunk sewers which serve most of the city today [1963], some 35 years later. The consultant's work showed that treated sewage could be discharged to Santa Cruz harbor through a submarine outfall without endangering public health or creating a nuisance and that this would be the most economical of the feasible alternatives. The citizens of Santa Cruz, opposed to any discharge which might threaten the beaches bordering the harbor, protested with such vigor that the council selected a more expensive alternative for treatment and disposal. The major structure, housing sewage screens and pumps, still serves as the pumping station for the present plant at Neary's Lagoon. The land section of the outfall line, laid in tunnel beneath the bluff between the lagoon and the ocean, is still in service.[4]

The City decided to construct the screening plant because it was thought by the officials that such a plant would be more economical to operate and present less of an odor problem than the other types proposed. The screening plant was constructed in 1928 at the site of the present sewage treatment plant.

At the same time the screening plant was constructed, interceptor sewers were laid to collect the sewage from the various collection systems within Santa Cruz and convey it to the plant. The consulting engineers recognized the problem of storm water entering the sewers. In their report to the City appear the following statements:

It is an established fact that some of the older sewers, especially those in low ground, and many of the house connections, have been very poorly laid and permit unduly large amounts of ground water to enter. Certain sewers are at times surcharged on that account.... A careful investigation should be made at times of high ground water to determine where the worst leaks occur. Such places or sections of sewers should be repaired as opportunity and money therefor becomes available.

In the future, all house connections and all public sewers must be more carefully laid and every precaution taken to produce tight joints.

The interceptors were designed to handle flows larger than those normally expected for the design period. Disposal for the entire sewer system was through the outfalls which are still in use today [1954].

Bypassing Facilities

From the time the interceptor sewers were constructed in 1928 until 1950, a number of bypasses were installed in the sewer system to allow escape of excess flows.

About 1928 bypasses were installed near (1) Neary Lagoon, (2) the intersection of Center and Laurel Streets, and (3) the intersection of Forest and Soquel Streets. The Neary Lagoon bypass was so constructed that it never functioned properly. Eventually the City plugged it with concrete. The Center Street installation allowed overflow from the sewer system to enter a storm sewer. Because City officials feared flow in the opposite direction from the storm drain to the sanitary sewers, thus increasing the hydraulic load on the sewer system, the bypass was removed in 1948. The Forest

Street bypass was also connected to a storm drain. During certain occasions, the sanitary sewer became clogged and raw sewage flowed to a ravine where odor problems resulted. To prevent recurrence of such a condition, the bypass structure was removed in 1950.

In 1938 an overflow manhole was constructed on East Cliff Drive between Pearle and Jessie Streets to prevent overflows to streets in the vicinity of Holland's Auto Court. Being at a low point in the collection system and of an overflow type, it occasionally permitted discharge of raw sewage to San Lorenzo River during summer months as well as during the rainy season. For this reason, it was replaced in 1948 by a valve-operated bypass under the Ocean Villa Bridge on East Cliff Drive.

Two other bypasses were constructed, one under the Soquel Street Bridge discharging to Branciforte Creek, the other at the intersection of Laurel and California Streets discharging to Neary's Lagoon. The former was plugged with concrete in 1946. The latter was eliminated in 1952 when the Laurel Street relief sewer was laid.

Three bypasses which permitted discharge of raw sewage from the West Cliff Area and a portion of the Mission Hill Area directly to the outfall line in the tunnel have been eliminated: one on Beach Curve (Bethany Curve) in 1946; the second, near the intersection of Columbia and Santa Cruz Streets, in 1947; the third, near the intersection of Bay and Centennial Streets, in 1948.

In 1950 the valve-operated bypass behind the Garibaldi Hotel was constructed to discharge to the San Lorenzo River. Its elevation, however, is such that flow from the sewer to the river by gravity is impossible when the river level is high.

At the present time [1954] only the bypasses under the Ocean Villa Bridge and behind the Garibaldi Hotel are still in existence. From Twin Lakes pumping station, raw sewage is bypassed at times of large flows to Woods Lagoon.[5]

Since 1946, construction of relief sewers in the most critical areas has made it possible to reduce the number of bypass locations but not to eliminate bypassing.[6]

Difficulties with Outfall Sewers

Almost since the time the outfalls were originally constructed, the City of Santa Cruz has experienced difficulties with them. One of the outfalls was broken by 1931. In 1933 it was repaired but a few months later was leaking again. By 1940 both outfalls were broken about 500 feet from shore. Since that time one of the outfalls has been displaced to such an extent that it discharges at a point only about 300 feet from the beach.

Diarrhea Outbreak

In August, 1946 a sewer near the intersection of Mountain View Avenue and Logan Street became blocked, and sanitary sewage was diverted temporarily into a storm drain. The sanitary sewer was then flushed, the flushings being allowed to enter a tidal pond about 100 feet long, 25 feet wide, and 2 feet deep. After children were observed wading in the contaminated water, the basin was filled with sand and disinfected with chlorine solution. Of the children who played in the water, 75 were stricken with diarrhea.

Proposal of the City to Reconstruct Its Sewage Treatment Plant

Prior to 1941 both submarine outfalls had broken, the outfall sewer between the screening plant and the ocean had ruptured causing sewage to flow onto the beach, a number of bypasses were being used, and hydrogen sulfide was attacking the screening plant and causing odor complaints. To find the best solution to these problems, the City hired Harry N. Jenks, consulting sanitary engineer, to investigate, prepare a report, and make recommendations concerning needed improvements to the sewerage system. In January, 1944, having received the report and recommendations of the consulting engineer, the City of Santa Cruz submitted an application to the State Board of Public Health for a permit to construct enlargements and improvements to the system. Specifically the application requested permission to

substitute treatment involving vacuator flotation, separate sludge digestion, sludge lagooning, and chlorination of the effluent for screening. Final disposal was to be accomplished by pumping through outfall lines to the Pacific Ocean.

In the engineering data accompanying the application, the consulting sanitary engineer submitted the following comments:

In the operation and maintenance of the Santa Cruz sewer lines and the screening and pumping plant, as well as the ocean outfall including the tunnel line, it is evident that the system has reached a critical point in respect to dependability of service and capacity. The entrance of water into the sewers, either in the form of ground water or surface drainage from roofs and streets, so overtaxes the sewer lines during the rainy seasons that widespread overflowing of manholes occurs during each storm, with consequent nuisance and danger to health. This condition prevails despite the bypassing of substantial amounts of sewage from the system into San Lorenzo River, and into the ocean, without screening or other treatment....

During the course of the investigations it became apparent that it is impracticable to remedy the leaky condition of the sewer system as a whole. Mitigated solely by the construction of a selected number of new sewer lines to replace or relieve certain existing sewers, the problem of excessive wet weather flows will have to be met by handling these flows as they come.

Also, so far as disposal is concerned, it appears that experience at Santa Cruz teaches the inadvisability of attempting to maintain indefinitely an ocean outfall beyond a point offshore sufficient to ensure reasonably adequate dispersion of a well-clarified and disinfected sewage treatment plant effluent. In other words, by suitably increasing the degree of sewage treatment it should be possible to offset any progressively increasing operating deficiencies of the outfall tunnel and line into the Pacific Ocean.

Taking into account the general financial situation and the relative urgency of the needed rehabilitation of various portions of the sewerage and sewage disposal system, it is quite certain that the city cannot undertake the required improvements except on a unit basis, beginning with the outfall system and continuing through the treatment works to and including the main sewer lines themselves.

State Board of Public Health First Permit

Upon receiving the application, the State Bureau of Sanitary Engineering investigated the proposal of the City of Santa Cruz. In its statement to the State Board of Public Health, the Bureau emphasized the unsatisfactory conditions existing at that time in Santa Cruz insofar as sewage treatment and disposal were concerned. In his report to the State Board, C. G. Gillespie, then Chief of the Bureau, made the following comments about the outfalls:

Due to the heavy seas, these outfalls have been disrupted and not only broken at a distance of about 600 feet offshore, but they have moved laterally so that the main outfall in use now discharges almost 600 feet easterly from its original alignment and the west pipe appears to have moved about 100 feet westerly. There the depth of water is about 15 feet. Furthermore, sewage of a considerable section of the town between the screening plant and the ocean cliffs has been diverted directly into the outfall sewer. Raw sewage from this area amounting to something like 500,000 g.p.d. [gallons per day] is disposed of to the ocean without screening treatment. Furthermore, the outfall sewer at the ocean cliffs has broken and at high tides or unusual sewage flow a considerable portion of the sewage, both screened and raw, spills overboard directly at shore. These conditions should be remedied at once and in event of a choice of projects, in our opinion these improvements should precede those applied for.

He recommended that permit be granted as applied for with the usual provision that there be no nuisance or menace to health in the sewage treatment or in the disposal of sludge or effluent. He further recommended that the City be urged to consider carefully a relocation of the proposed improvements and that sludge drying be considered in place of sludge lagooning.

On May 9, 1944 the State Board of Public Health granted a permit to the City Council of Santa Cruz as applied for. A portion of the permit letter is quoted below:

No protests having been made and in view of the desire of the city to make this change, permit has been granted as applied for on the provision that no nuisance or menace to health shall be caused by the operation of this treatment plant or disposal of effluent, and on the special provisions that in the event the disposal of sludge by lagooning methods causes a nuisance, drained sludge beds or some better method shall be at once substituted. It is also required that present defects in the outfall system and consequent pollution of the shore line be remedied prior to the above improvement.

In view of the critical location of this sewage treatment plant, it is recommended that the city give special consideration to a location for these improvements on the north side of the existing swamp so that better isolation from neighbors may be obtained.

Bond Issue

In 1946 a bond issue was presented to the people of Santa Cruz, as follows:

Shall the City of Santa Cruz incur a bonded indebtedness in the aggregate principal amount of \$400,000 for the object and purpose of acquiring, construction and completing the following municipal improvement, to-wit:

A sanitary sewage disposal system, including primary treatment plant by vacuum flotation and with outfall tunnel bypass sewer line, lift stations and siphons, reconstruction of existing sewers, new lateral and intercepting sewers, pipes, machinery, pumping equipment, and other works, property or structures necessary or convenient for sanitary sewage disposal system?

...The bond issue was passed.

State Board of Health Second Permit

Final plans and specifications for the construction of the project were submitted to the Bureau of Sanitary Engineering on June 20, 1947. Because certain modifications had been made in the proposed treatment, the permit was reissued by the State Board of Public Health. The permit granted on October 30, 1947, was subject to the following conditions:

1. No sewage or sewage effluent, sewage sludge or scum or supernatant sludge liquor, or any matter or substance offensive, injurious or dangerous to health shall be discharged from the plant or disposed of into waters of Monterey Bay or onto adjacent shores in such manner, quality or quantity as to be a public health nuisance, offensive, injurious or dangerous to the public health;
2. Fecal matter, sewage, grease, garbage, solid matter, sludge or oily sleek recognizable as of sewage origin from the sewerage system of Santa Cruz shall not be permitted along the shores of the Monterey Bay, or in its waters, except that unavoidable discoloration or oily sleek from said sewer system may be permitted around the outlet of the outfall;
3. There shall be no noxious or offensive odor, gases or fumes, of sewage origin in the water or along the shores of the Monterey Bay, or in the air outside the tract of land upon which said sewage treatment plant is located, such that they may constitute a public nuisance;
4. No condition or conditions due to this sewage treatment and disposal shall exist or be permitted to exist which may constitute a hazard to the health of human beings or animals, or which may constitute a public nuisance under the laws of the State of California;
5. The sewage plant effluent shall be disinfected by chlorination equipment such that the quality of water along the shores of Monterey Bay will be safe and suitable for recreation during the bathing season and will conform

to the bacterial standards as established by the State Board of Public Health as modified from time to time for safe recreation;

6. Additional treatment works, changes in outfall or improvement of operation shall be provided when required by the State Department of Public Health.

Construction Since 1946

Construction of the sewage treatment plant was completed in 1949.

The Mission Street relief line has been laid. This line extends along Mission Street from Western Drive to Fair Avenue, along Fair from Mission to Oxford Way, along Oxford to Beach Curve and hence to the sewage treatment plant. On Mission the relief sewer is 10 and 12 inches in diameter; on Fair and Oxford, 21 inches; the remainder, 16 inches.

The 10 and 15 inch diameter Laurel Street relief sewer laid in 1952 extends along Laurel Street from California to Myrtle Streets, along Myrtle to Jennie Street, then east to a point where it discharges into the 30 inch sewer at Neary Lagoon.[7]

Although leaks in the onshore portion of the outfall were repaired, it was not possible to restore the original submarine outfall lines. Numerous bacteriological analyses of water samples from beaches onshore from the outfalls revealed contamination in excess of limiting values established by the State Health Department for bathing waters. Replacement of the outfalls with a new line extending 2,000 ft offshore was completed in 1958. No physical difficulties have been experienced with the new outfall.

In 1956, a bond issue in the amount of \$450,000 was passed principally to finance construction of relief sewers in several parts of town and to complete replacement of the submarine outfall. As of July 1, 1963 the outstanding principal amount was \$210,000.

Remedial work accomplished in past years has served to eliminate overflowing at many upstream locations in the system. Principal trunks leading to the plant, however, do not have sufficient capacity to handle peak wet weather flows. Overflows and bypassing during storm periods are still normal occurrences. Pumping capacity at the plant cannot be expanded without concurrent reconstruction both of plant units and the land section of the outfall. The present treatment unit cannot accommodate flows over 10 mgd, while rates over about 16 mgd cannot be pumped through the land portion of the outfall without the danger of rupturing the pipeline.

On May 25, 1963, while the present survey was in progress, the Regional Water Pollution Control Board, recognizing that the treatment plant was not meeting existing requirements and had not met them for some time, instructed its staff to prepare a cease and desist order. The Board advised the city that its requirements were not being met and that a cease and desist order would be considered at a subsequent meeting. The following items are taken from the conclusions of the May 1963 staff report to the Regional Board:

1. The Board's requirements for the City of Santa Cruz's waste discharge specify limitations of: (1) 150 ppm of suspended solids; and (2) 2.5 ml/l of settleable solids.
2. The data clearly indicate that the City's waste discharge has exceeded these requirements in more than 20% of the samples analyzed since 1960.
3. Requirements specify a bacterial limitation for the shore waters in the vicinity of the outfall of less than 10 coliform organisms per milliliter in at least 80% of the samples analyzed.
4. The City's own test results indicate that the bacterial limitation was exceeded in more than 20% of the samples analyzed since 1962.
5. The requirements were exceeded in from 25 to 58% of the samples analyzed during the middle of the 1962 recreational season when maximum public use of the beach and shore waters could be anticipated.

6. The City's present waste treatment facilities are incapable of providing the degree of treatment necessary to meet the Board's requirement.

Authorization of Survey and Report

Recognizing the need for long-range sewerage planning as well as the need for correction of existing deficiencies, the City Council, on March 27, 1962, authorized the City Manager to enter into an agreement with the consulting engineering firm of Brown and Caldwell. Executed on April 10, 1962, the agreement provided for an engineering study and the preparation of a report covering all phases of the work thus undertaken.[8]

Footnotes

1. A Report on Public Health Aspects of the Sewerage System and Waste Discharges of the City of Santa Cruz; Prepared for Raymond C. Leer, M.D., Health Officer, Santa Cruz County; By State Department of Public Health, Bureau of Sanitary Engineering, March, 1954; p. 5.
2. A Study of Sewage Collection Treatment & Disposal for Santa Cruz and Vicinity; A Report Prepared for City of Santa Cruz, California; Brown and Caldwell; Consulting Engineers; San Francisco, California, 1963; p. 2.
3. A Report on Public Health Aspects of the Sewerage System and Waste Discharges of the City of Santa Cruz, pp. 6–7.
4. A Study of Sewage Collection Treatment & Disposal for Santa Cruz and Vicinity, pp. 2–3.
5. A Report on Public Health Aspects of the Sewerage System and Waste Discharges of the City of Santa Cruz, pp. 7–10.
6. A Study of Sewage Collection Treatment & Disposal for Santa Cruz and Vicinity, p. 3.
7. A Report on Public Health Aspects of the Sewerage System and Waste Discharges of the City of Santa Cruz, pp. 10–14, 16.
8. A Study of Sewage Collection Treatment & Disposal for Santa Cruz and Vicinity, p. 4.

Sources

- *This article is excerpted and compiled from: A Report on Public Health Aspects of the Sewerage System and Waste Discharges of the City of Santa Cruz, 1954 and A Study of Sewage Collection Treatment & Disposal for Santa Cruz and Vicinity, 1963.*

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