Mr. O. E. Stanley,
Chief, Bureau of Maintenance.

Dear Sir:-

I desire at this time to submit a report of the repairs
made, just recently, to the Front Street Intercepting Sewer near
the pumping station, work having been done under Job #9046.

This being a job very much out of the ordinary, I assume
that Mr. Leurgaard, Mr. Barbur and yourself would appreciate a detail-
ed report relative to the methods used and daily progress of the work.

The first suspicion of there being any defects to the sewer
was during the summer months. A yellowish, milky water, resembling
sewage was oozing out into the river through an expansion joint in
the seawall located at the south boundary line of the pumping station.
As you requested, I made a thorough examination of the sewer at that
time.

With the gate open the yellowish water extended out into
the river about 10 inches. I then caused the gate to be closed,
creating a head of water in the sewer. Under these conditions the
yellowish water extended out into the river about fifteen feet.
I requested Mr. Lundell to pump out the sewer, this causing approxi-
mately an equal head on both sides. Immediately the colored water
disappeared.
While the pump was operating, Foreman Troxell and myself entered the sewer and made a thorough investigation of the inner walls. The conditions at this time were unusually bad; however, we located all the cracks during this first inspection.

On Monday, September 8th, all preparations were made to operate a Quigley cement gun. On Tuesday, September 9th, the gate was closed and the pumps set in operation. Four of the largest cracks above the water level were cleaned, sand blasted, and washed using a hose under 70 lb. pressure. The Quigley cement gun was then used filling the cracks with a one to one mix of mortar. The entire operation was personally inspected by myself. I therefore can pronounce it a first class job.

The sewage at this time was from 22 inches to 26 inches deep and running very rapidly. We were unable to do any repairs below the water level.

On Saturday, September 13th, we were authorized by Mr. Laurgaard to proceed with a complete repair to the sewer.

On Monday, September 15th, preparations were made in the way of ordering timbers of necessary dimensions - ordering approximately 230 lineal feet 30-inch corrugated pipe, including connecting band of special make, a cone 36 in. x 30 in., a 6x30 in. T. and special constructed pipe to fit a curve of a 30-foot radius, making arrangements for the Quigley cement gun and equipment, making all necessary requisitions, hiring extra men and arranging the two shifts.

Tuesday morning the work was progressing rapidly running two shifts from 6:30 A.M. to 11:30 P.M. in order to hasten the work for fear of heavy storms.
The method used for installing the 30-inch pipe was as follows: 38 bents were constructed of 6"x6" timbers, heavily braced with 2"x6". These bents were set in place 6 feet apart, parallel with the north wall of the sewer. We experienced considerable difficulty owing to the fact that the bents had to be forced down upon the floor of the sewer and secured. This work had to be accomplished in about 24 inches of swiftly running sewage. The floor of the sewer was covered with from 6 inches to 18 inches of sand and sediment which had to be removed principally by agitation with the bare hands. Each end every bent had to be securely stayed one to the other, also heavy braces extending to the ceiling.

Subsequent to the installation of the foundation, immediate preparations were made to lower the 30-inch pipe. It was necessary to lower the pipe down the gate chamber during low tide, forcing it through under the gate, pipe being submerged under about 40 inches of moving sewage. Under these conditions the pipe were dragged about 50 feet up grade to the lower end of the platform. The pipe were then elevated onto the platform and dragged to the upper end a distance of 230 feet, each 10-foot joint of pipe weighing about 300 lbs.

After the pipe were instelled, bulkheads or dams were constructed with sacks of sand. At the upper end the bulkhead was constructed nearly to the crown of the sewer in order to create a head to increase the capacity of the 30-inch pipe. At the lower end the dam was about two thirds the height of the sewer. The bulkheads were well braced with timbers.

Two siphons were installed at the lower end in order to siphon out the sewage between the two bulkheads.
The actual work of repairs to the sewer was of a minor nature compared to the necessary preparation.

Repairs to the Sewer.

The small cracks were chiseled out by hand and with a machine gun to a depth of from 2 inches to 8 inches deep, conditions governing the depth of cracks. I personally inspected the actual repair of each and every crack.

The cracks were cleaned, sand blast method, and then cleaned by compressed air, following with a Quigley cement gun using a one to one mix of "Lumnite" cement. We experienced no particular difficulty with the repair work except with station "3E" (as shown on the original drawing). The head beneath the sewer at Station "3E" forced the water up through the floor with such intensity we were unable to hold the mixture in place. In order to relieve the heavy pressure from below, we inserted a 6-inch iron pipe down through the floor of the sewer allowing the pressure of water to flow through the pipe giving relief to the remaining portion of the floor of the sewer. After the repairs were completed and the cement given time to set properly, the iron pipe was plugged, concreted full and left in place.

On Tuesday, September 23rd about 7:15 P.M. the pump sucked air causing it to stop. The sewage below the dam raised so rapidly that it overflowed the dam and washed it out before the pump could be started again. The sewer immediately flooded with sewage causing the crew to rush for the manholes and climb for the top.

We finally pumped out the sewer and rebuilt the dam end were about ready to begin the regular work when a train of
cara, southbound on Front Street, ran over our fire hose cutting it in half, pulled the plug out of the hydrant, destroyed hydrant gate, lanterns and barricades. In view of the fact that this hose line was feeding one of our siphons, it caused another delay to the crew until I could get in communication, by phone, with the hydrant crew of the Fire Department, also with my emergency crew to deliver to us more hose. We finally overcome these two quite stubborn obstacles, happening one after the other on the same night shift.

Wednesday morning, September 24th at 2:00 A.M. there came a sharp storm. (I had been down in the sewer all night with the men, Foreman Troxell was about worn out. I sent him home in the early evening). I had just called Mr. Lundell down into the sewer to show him the heavy head beneath the sewer at Station "3E". The corrugated pipe became overloaded, owing to the sharp storm, and before we realized was spurring water through small holes the entire length of the 230 feet of pipe. We all made another rush for the manholes. Before the last man was out of the sewer, the water was flooding over the top of the upper dam. The dam washed out and in less than three minutes the 78-inch sewer was carrying full capacity. At manhole #3, at the pumping station, the water raised above the crown of the sewer. We finally became master of this situation, rebuilt the dam, and found that the other work had not been damaged by the flood.

I desire at this time to commend Foreman Troxell and the crew of men that worked on this job, their faithfulness and willingness under the contaminated exposure and the oft times hazardous conditions is well worthy of mention. There were men
that worked in the sewage for hours, nearly to their armpits. At one time I saw a man with only his head above water. He had gone in over the top of his wading boots and kept on working in the sewage.

The arms and shoulders of the men who were assigned the work of setting the bents were saturated with sewage for several eight hour shifts. Six men were sent to the hospital, four with infected hands, one man injured his back, and the sixth man had a compound fracture of his right foot. On several forenoon shifts the sewer gas was so strong that some of the men had to leave the sewer for fresh air. On three different occasions during working hours the sewage ran blood red for about one half hour. On the morning of September 22nd for about three hours the ether fumes were so strong that it was very disagreeable to the men in the sewer.

I also desire to commend the generous assistance given by Mr. Lundell. At all times he was one of the boys regardless of what came up.

I hope that this report may be interesting to yourself and to other officials.

Yours truly,

Chase Robinson
GENERAL FOREMAN

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