

M/s Nagpur Casting Co. has constructed a water reservoir for their Pig Iron Plant at Siltara near Nagpur. The water reservoir is 600m x 250m in size and has 8m high embankment all round the reservoir.

Two water outlet pipes of 900 mm diameter and made of concrete are situated near the ground level to supply water to the plant. In addition to the two normal water outlet pipes, two more similar pipes of the same diameter have been provided as emergency outlets for emptying the reservoir. It has a separate water supply system to fill it.

The 8m high embankment was built up first and four 900mm diameter pipes were placed in position by cutting the embankment and reconstructing the excavated portion of the embankment. The four pipes have a system of opening closing the water entry from the reservoir and these are situated in the reservoir water side.

After the construction of the four water outlet pipes, filling of the water in the reservoir was started. But when the water level reached about 6m from ground level, heavy water leakage was seen around the pipes on the external side of the embankment. The leakage was of such a nature that the soil around the pipes was getting washed out creating cavities around the pipes. As the water entry system was not yet open, it was evident that the water was finding entry around the pipes of the inner face i.e. water side of the embankment and as cavities were being formed on the external (outer) face of the embankment, it was correctly surmised that such cavities were also formed on the inner face of the embankment.

Emergency repair measures adopted by the clients were of no avail and even their consultants **M/s. M.N. Dastur** were contacted. At this juncture **CICO** was contacted to stop the leakage of water from the reservoir which stood about 5-6 m above the pipes.

CICO tackled the problem successfully after undertaking the real reason of the problem. The solution was stabilisation of the soil surrounding the pipe by injecting **POLYGROUT** a water reactive flexible barrier which would fill the cavities and also stabilise the surrounding soil.

The essence of repair consisted of drilling holes in the reinforced concrete pipes and injecting **POLYGROUT** through nozzles fixed in the holes drilled in the reinforced concrete pipes. As the holes drilled were of 20 mm diameter, the entry of water through the nozzle did not involve any insurmountable problem. Four horizontal axes at right angles to each other were used for locating the holes and the holes were approximately spaced at 600 mm. In addition to the injection of **POLYGROUT** through the RC outlet pipes, the external face of the embankment was stabilized by injecting **POLYGROUT**.

The typical cross-section of the embankment having the RC pipes. The protection afforded to prevent entry of water was perhaps well thought of. However, if the concrete layer running on the inclined and horizontal face had been placed on the polymeric felt prior to the insertion of the concrete pipes, significant damage to the felt and concrete layer could have been expected which would allow water to escape through the portion of the re-constructed embankment in which the compaction may not be upto the desired level or as that available in the normal portion of the embankment which had been constructed in layers with adequate compacting effort.

The job of prevention of water leakage was successfully completed in seven days to the full satisfaction of **M/s. Nagpur alloy Casting Co.** and their consultant **M/s. M.N. Dastur & Co.**