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Corporate Plan Output: Liquid Waste	

The purpose of this report is to outline the main learning points from the North American No Dig conference in Orlando, Florida, attended by Graham Williams in late May 1999.

The purpose of the visit was to gain information on new and existing Trenchless Technologies and assess them for possible use in Christchurch for rehabilitating problem sewers.

CHEMICAL GROUTING

The main technology to be assessed was that of chemical grouting, especially in relation to the ring degradation problems in the New Brighton area and for high infiltration areas.

BACKGROUND

Pipes laid in the New Brighton area between 1951 and 1956 were mainly concrete pipes with a spigot and socket joint which incorporated a rubber ring seal. These joints were used because of the high ground water levels, which were influenced by tides as well. They replaced the previously used mortar filled joints which could have had the mortar washed out of the joints by the ground water. The use of these joints was initially intermittent with them mainly being used in the New Brighton, Burwood, and Shirley areas. These joints however became almost the standard practice in the 1960's when concrete pipes were widely used for sewer mains. The problem arises from the fact that there was no standard for the rubber rings or standard composition. Recycled rubber was widely used. Because of this the rubber used had no anti-bacterial agents and is now being slowly eaten away in the joints. This means that we have many pipelines with perfectly good pipes that have suspect joints. This has the potential to become a major problem to the Council in the coming years as the rubber disintegrates letting in ground water and sand, which will cause eventual collapse of the pipes. There was no standard introduced for the rubber rings until 1970 after which time ring deterioration problems are expected to be considerably improved. However pipes laid using rubber rings before 1970 could be subject to problems. Rubber rings are now almost exclusively used for pipe jointing.

Some Closed Circuit Television Video (CCTV) work has been carried out in the New Brighton area and does not show that there is a major infiltration problem at this stage, but rings taken from some pipes during repairs have almost completely disintegrated. The main problem areas will be New Brighton, Burwood and Shirley because of the high ground water levels but other areas will eventually also become a problem. Not only is the damage to the pipelines a problem but the extra cost for pumping and treatment. There are also some problem areas in much older parts of the city which need to be looked at to reduce infiltration.

THE WAY FORWARD

The challenge is to find a suitable solution to this problem. There are several possible alternatives, and some of these are listed below:

- We can wait until a problem occurs and repair these as they arise.
- We can put in place a gradual replacement or relining programme for these areas.
- We can trial techniques such as chemical grouting and if successful put in place a programme to cover the problem areas.

In the USA this chemical grouting is well used and has been for a number of years. In Florida, which has similar ground conditions to parts of Christchurch with high ground water and sands, it is the main technology used to combat infiltration. The technique is to place a plug on either side of each joint, inside the pipe, and after testing to prove a leak, inject chemical grout into the joint which is forced through the leaking joint and mixes with the surrounding ground to stop the flow of ground water through the joint. This grout is like a jelly, which remains flexible after setting. In the early years there were some doubts about the longevity and the possible toxicity of the Acrylamide grouts used. Although Acrylamide grouts are still used and considered by some to be the best, Urethane grouts are also available now and the technology has improved to give a much more long lasting result.

Costs in most countries overseas, which have a reasonable grouting programme in place, indicate that the cost of grouting is approximately 12% of replacement costs, though prices quoted by the industry to date are well above this figure. It should be pointed out that this is a method for rehabilitating the pipe and as such it only extends the life of the pipe for between 10 and 20 years. As this repair method becomes more widely known and used in New Zealand prices are likely to come down and make it economically viable. The final solution may be a combination of different techniques, but chemical grouting should be seriously considered.

OTHER TECHNOLOGIES

- Manhole rehabilitation by concrete and polyurathene grouting is used in the USA to a reasonable degree to rehabilitate existing cracked and leaking manholes instead of rebuilding them. In Christchurch manhole problems are not great but when encountered this technology should be considered. Considerable savings can be made and traffic disruption is minimal.
- CCTV of sewers has always relied on the human factor to interpret the tapes, and as a result, in many cases the results have been less than satisfactory with faults being missed or interpreted wrongly. A new system called "Sewer Scanner and Evaluation Technology" (SSET), has recently been developed and trialed. This SSET system can identify pipe defects, accurately locate and record them, and classify them. This system is new and trials are very promising. The Council should keep up with its development as it has potential for better consistency and also savings in this area.

- An inpipe relining system to reline pipeline junctions and also the lateral in one operation has recently been developed in the USA and has real potential. No digging of the road is necessary. This system was demonstrated at the conference and has potential for use in Christchurch.

SUPERVISION OF NEW WORK

During discussions with participants at the conference it was amazing to find that many Councils in the USA are spending a lot of money to rehabilitate pipelines as young as 40 years old. These pipes are cracked and broken, not the ring problem mentioned earlier. In Christchurch pipelines of this age are mainly still in very good condition despite the difficult ground conditions in many areas. This can be put down to the extra supervision that we give to all new pipelines installed. This extra supervision is paid for many times over in years to come and is very worthwhile.

CONCLUSION

It is planned that the Waste Management Unit carry out some chemical grouting to further access its use for Christchurch. If this is successful a programme could be developed for high infiltration areas of this city and areas with ring degradation problems. The cost benefits of this system can be realised by the Council if a reasonable programme for its use is put in place. Cues, a company which manufacturers and sells equipment for chemical grouting, are going to Sydney later in the year to give training to purchasers in the use of the equipment. This Council has been invited to send a representative to this training. Other new technologies will be further assessed for their possible use in Christchurch. It is recommended that the Waste Management Unit send a staff member to Sydney for Cues Training later this year.

Recommendation: That the Waste Management Unit send a staff member to Sydney for training in sewer pipe rehabilitation techniques later this year.

Chairman's

- Recommendation:**
1. That the above recommendation be adopted.
 2. That Waste Management Unit staff be encouraged to keep up to date with practice and innovation internationally including attendance at overseas conferences and exhibitions where appropriate.
 3. That a report be brought forward in due course to identify any necessary changes to asset management plans.