

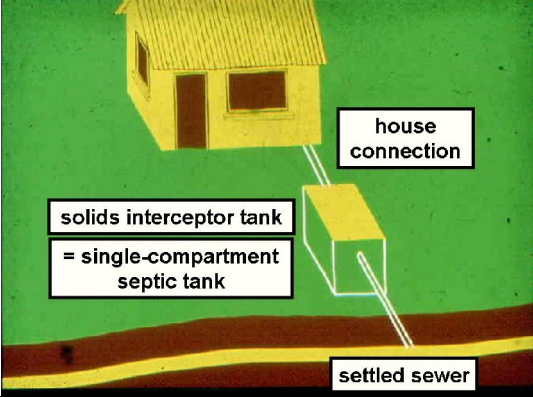




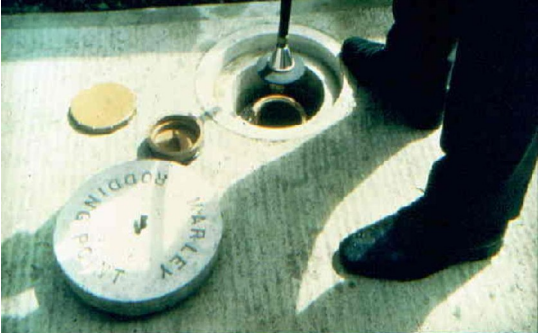
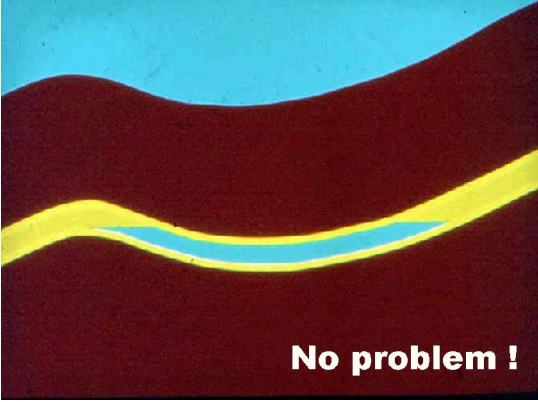
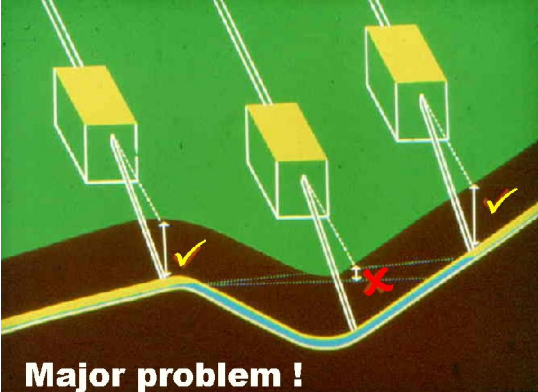


# SETTLED SEWERAGE

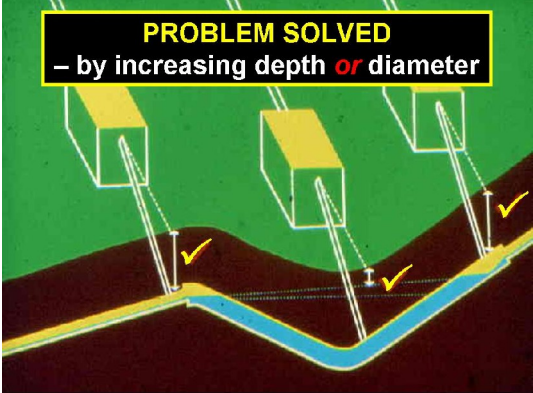
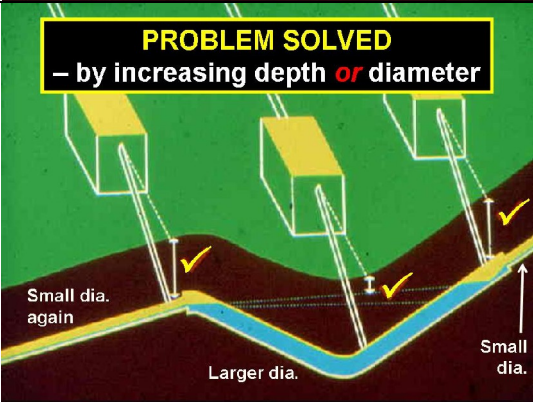
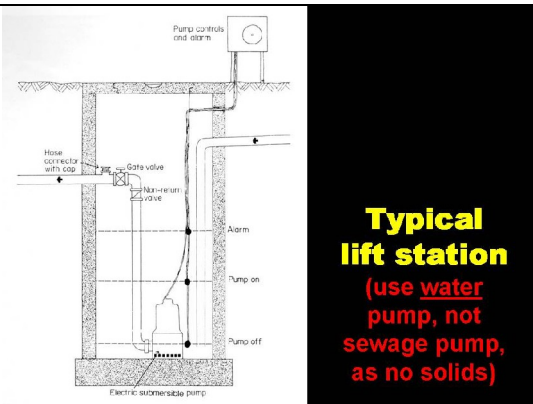

## Part 3 of 3


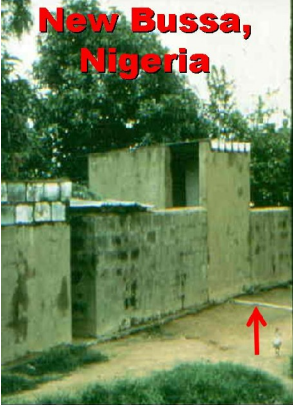

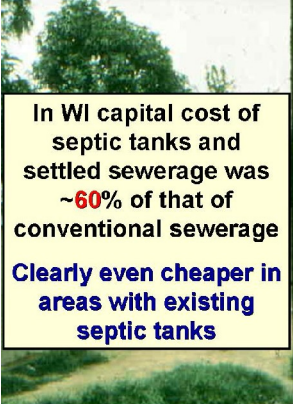


1.	<div data-bbox="438 477 796 524" data-label="Section-Header"> <h3>Operation &amp; Maintenance</h3> </div> <p>Sewerage Authority has to:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> ensure no illegal connections (of <u>unsettled</u> sewage) made</li> <li><input checked="" type="checkbox"/> <b>assume responsibility for desludging interceptor tanks</b> (as householders cannot be relied on to do this on time; costs can be recovered through monthly/quarterly water &amp; wastewater bill)</li> <li><input type="checkbox"/> regularly maintain any lift stations.....</li> </ul>	<p>Operation and maintenance of the settled sewerage scheme is obviously extremely important, and the sewerage authority first of all has to ensure that no illegal connections are made to the sewer as these would normally be of unsettled sewage and that would lead to rapid blockage of the settled sewer. Secondly, the sewage authority has to assume responsibility for desludging the septic tanks, the interceptor tanks, as the householders cannot be relied on to do this on time, and the sewage authority can recover their costs through the monthly or quarterly water bills. Thirdly, the sewage authority has to regularly maintain any lift stations which might be used in the main sewer sections.</p>
2.	<div data-bbox="352 987 874 1050" data-label="Section-Header"> <h3>Septic tank effluent discharging to street gutter, Greece (1978)</h3> </div> 	<p>This slide shows septic tank effluent discharging into a street gutter. This was taken in Greece in 1978 and is clearly an unsatisfactory situation</p>
3.	 <div data-bbox="667 1480 874 1744" data-label="Section-Header"> <h3>Pour-flush toilet effluent discharging to open drain in Kolkata</h3> </div>	<p>This shows something very similar, a pour-flush toilet effluent discharging to an open drain in Calcutta and this was taken a few years later in the 1980s.</p>

4.	 <p>house connection</p> <p>solids interceptor tank = single-compartment septic tank</p> <p>settled sewer</p>	<p>This slide shows again the basic components of a settled sewerage scheme. A house or a group of houses discharge their wastewater into an interceptor tank and the solids-free effluent from the tank is discharged into the settled sewer in the street.</p>
5.	 <p><b>South Australia</b> "Septic tank effluent drainage – STED"</p>	<p>Settled sewerage schemes are widely used in Australia, particularly in the State of South Australia where they are known as septic tank effluent drainage schemes.</p>
6.	 <p><b>PVC pipes....</b></p>	<p>PVC pipes are now very commonly used,</p>
7.	 <p><b>are easy to lay and joint</b></p>	<p>simply because they are easy to lay and joint;</p>

8.	<p><b>Inspection points, not manholes – and not at all junctions</b></p> 	<p>and instead of expensive manholes we use very simple inspection points, and we do not have to have an inspection point at every junction between one sewer and another, so costs are reduced.</p>
9.	<p><b>Roadside view</b></p> 	<p>This slide shows the roadside view of the top of an inspection point where access is available to the sewer for rodding out blockages.</p>
10.	 <p><b>No problem !</b></p>	<p>This slide shows a situation which can be expected to occur during the night in a section of the sewer which normally flows under pressure flow. There is some wastewater in that section of the sewer overnight, but that does not matter because there are no solids in the wastewater which will settle out because they have all been removed in the interceptor tank; so this is basically no problem, and when people get up in the morning and start flushing toilets and using water, discharging from sinks and showers, the wastewater which has been sitting in the sewer overnight will be moved down along the sewer.</p>
11.	 <p><b>Major problem !</b></p>	<p>This slide shows a major problem with the interceptor tank in the centre. Wastewater is going to flow from the sewer into that interceptor tank because the level of the invert of its outlet is below the hydraulic grade line.</p>



12.		<p>This problem should have been solved at the design stage either by increasing the depth by which the sewer under pressure flow is laid, or by increasing its diameter. The latter option is shown here.</p>
13.		<p>This also shows another very important point with settled sewers: the wastewater flows on the slide from right to left, starting off in a small diameter sewer, going to a larger diameter sewer in the section under pressure flow and back into a small diameter sewer again so we go from small diameter to larger diameter back to small diameter, and this is possible with settled sewerage but not with other sewerage systems such as conventional sewerage.</p>
14.		<p>This slide shows a typical lift station used with settled sewerage schemes. They are not very often required, only really in very flat areas; but, because the wastewater flowing in the settled sewer does not contain any solids, it is possible to use a water pump rather than a much more expensive sewage pump.</p>
15.		<p>This slide shows the sanitation block in New Bussa, Nigeria,</p>

16.	 <p><b>Sanitation block, New Bussa</b></p>	<p>and this slide shows the laundry facility in that block.</p>
17.	<div>  <p><b>New Bussa, Nigeria</b></p> </div> <div>  <p><b>Wisconsin, USA</b></p> </div>	<p>The slide on the left shows the laneside view of the sanitation block in New Bussa and the red arrow shows the sewer connecting the sanitation block to the lane sewer, which runs in the centre of the lane.</p> <p>On the right is a new housing estate in Wisconsin in the United States,</p>
18.	<div>  <p><b>In WI capital cost of septic tanks and settled sewerage was ~60% of that of conventional sewerage</b></p> <p><b>Clearly even cheaper in areas with existing septic tanks</b></p> </div> <div>  <p><b>Wisconsin, USA</b></p> </div>	<p>where settled sewers were put in simply because the capital cost of the septic tanks and the settled sewers was about 60 percent of that of conventional sewerage, so much cheaper; and clearly it would be even cheaper still in areas which had existing septic tanks.</p>
19.	<p><b>Commercial system, USA</b></p>  <p><b>Depending on elevations, it may be necessary to pump the tank effluent to the sewer</b></p>	<p>This slide shows a commercial system in the United States and, depending upon elevations, it may be necessary to pump the septic tank effluent into the sewer.</p>

20.

### Settled sewerage in the Nile Delta

- Villages of <5000 pop. – eg, El Mofty El Kobra, Governorate of Kafr El Sheikh:



This slide shows a settled sewerage scheme in the Nile Delta in Egypt, in the village of El Mofti El Kobra in the Governorate of Kafr El Sheikh, and this village has a population of about 3,000 people. In the picture on the left you can see the cover slab of one of the interceptor tanks in front of a house, and the picture on the right shows an inspection point in one of the sewers running through the village.