Extreme Security Pump Station for Mogale City

Fig 1

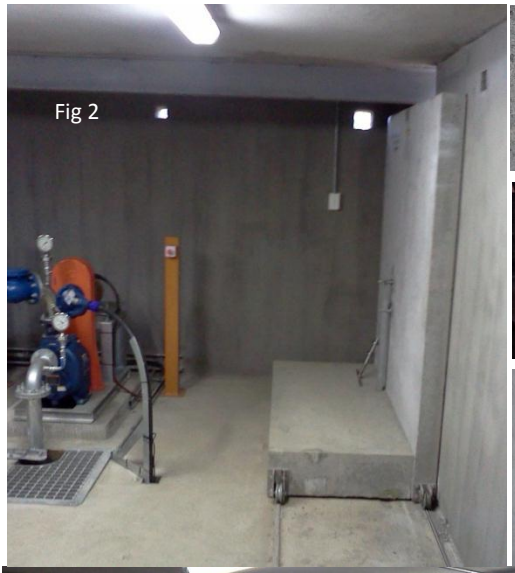
Fig 2


Fig 3


Fig 4


Fig 5

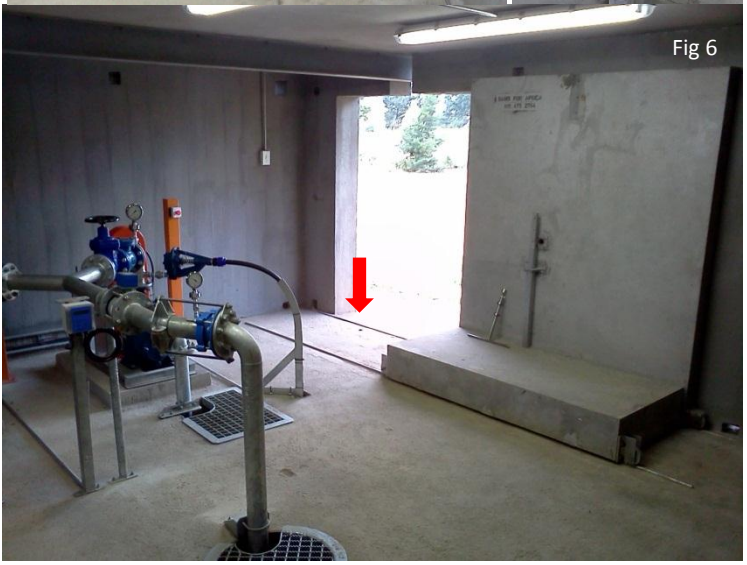
Fig 6

After thieves/vandals had stripped the Boiketlo sewerage pump station of its pumps, pipes, control panel and cables for the second time, at a cost of a few hundred thousand rand, the municipality appointed Tecroveer Projects (Pty) Ltd to design and build a facility that is arguably one of the most secure in South Africa. It needs to be since it is situated in a very remote area on the outskirts of Mogale City!

Fig 1 is a view of the new pump house which is characterised by four elements: (a) reinforced concrete roof (b) reinforced concrete walls (c) no windows, but rather 100mm ventilation holes top and bottom, and (d) 60MPa reinforced concrete door. Note that concrete is immune to oxy-acetylene attack, and is too thick for angle grinders to penetrate, and since the door has 5% (vol/vol) steel reinforcing it is all but impenetrable to chisel attack.

A challenge presented by a concrete door is its weight – for example the one in picture weighs 2000kg, and hence every precaution should be taken to ensure that it will never fall over and cause serious injury or death– neither during its installation or during its operational life. Concrete doors should therefore have a three dimensional aspect to their design, so that they are substantially stable against overturning. This may be achieved by adding a horizontal stabilizing panel to the base of the main panel (see fig 2 & 6). Such doors may appropriately be called 'platform' doors, SA Patent 2008/06587, manufactured and installed by Dams for Africa (Pty) Ltd. It is evident that the door is a sliding door, supported by two wheels at either end that run on tracks that are partially embedded in the concrete (see figs 2 & 6). In fig 2 the door is in its closed position, while in fig 6 it has been pushed open.

Opening sequence of Door

Fig 3: The first step to opening the door is to remove the stainless steel plug (see fig 3) from the 'access hole', using a cylindrical 'magnet' (see fig 5) at the tip of the 'opening tool'.

Fig 4: With the plug in hand, the opening tool is inserted into the access tube.

Fig 5: The pinion passes through the access tube until it reaches a matching 'spline-plate' at the end of the tube, which is bolted to the door on the inside. The gap between the pinion and spline-plate is a fraction of a millimetre. The former may be considered as the 'key', the latter as the 'keyhole'. Both these components may be varied by changing the number of teeth, the shape of the teeth and the size of the teeth, resulting in hundreds of possible combinations, so that each opening tool may be customised if required. The spline plate and matching pinion are easily replaced with a new combination should an opening tool every get into the wrong hands.

Having passed through the spline-plate, the pinion engages the teeth of the vertically oriented 'rack-bar'. This bar, 40mm x 40mm in section, is guided by a bracket attached to the vertical panel, and also by a hole in the platform. The rack-bar is shown here in its up (unlocked) position. However, when the door is in its closed position, the rack will enter into an 'anchor hole' in the concrete floor. The position of this hole is shown by a red arrow in fig 6. Once the bar has engaged the hole the door is effectively locked (see fig 2), so that only by turning the handle of the opening tool (from the outside) will the rack-bar move upwards out of the anchor hole.

Fig 6: The platform door seen in its fully open position. The door may be pushed open by one person and rolls with surprisingly little effort given its heavy mass (thanks to two ball bearings in each of the four wheels).

The Platform Door is manufactured by Dams for Africa (Pty) Ltd. Contact Dr Nicholas Papenfus at 011 475 2764/8381, or 082 416 8958. A variety of other concrete doors are also available, depending on the application – see www.damsforafrica.com. Further products in our range include various concrete lids (for valve chambers), and various vaults with slidable/liftable members (for protection of transformers, borehole installations, stand alone control panels, etc). Products can be made to any size, all from 60MPa with up to 5% reinforcing.