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## 6. Anchored Diaphragm Walls for Excavation in Zurich (Switzerland)

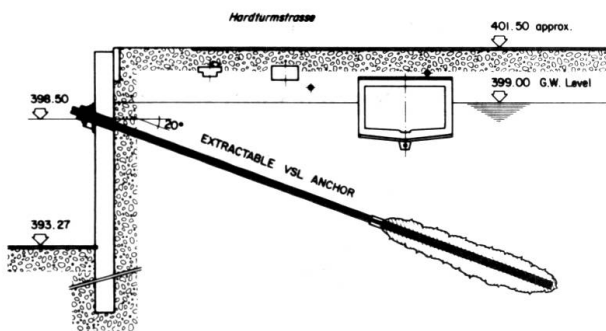
<b>Owner:</b>	<i>General Directorate of Swiss Postal Administration, Berne</i>
<b>Engineer:</b>	<i>Emch &amp; Berger Zürich AG, Zurich</i>
<b>General Contractor:</b>	<i>Oerlikon-Bühlle Immobilien AG, Zurich</i>
<b>Contractor:</b>	<i>Fietz &amp; Leuthold AG, Wallisellen</i>
<b>Drilling Contractor:</b>	<i>Injectobohr AG, Zurich</i>
<b>Soil Anchors:</b>	<i>VSL International AG, Lyssach</i>
<b>Construction periode:</b>	<i>October 1986 – December 1987</i>

### Introduction

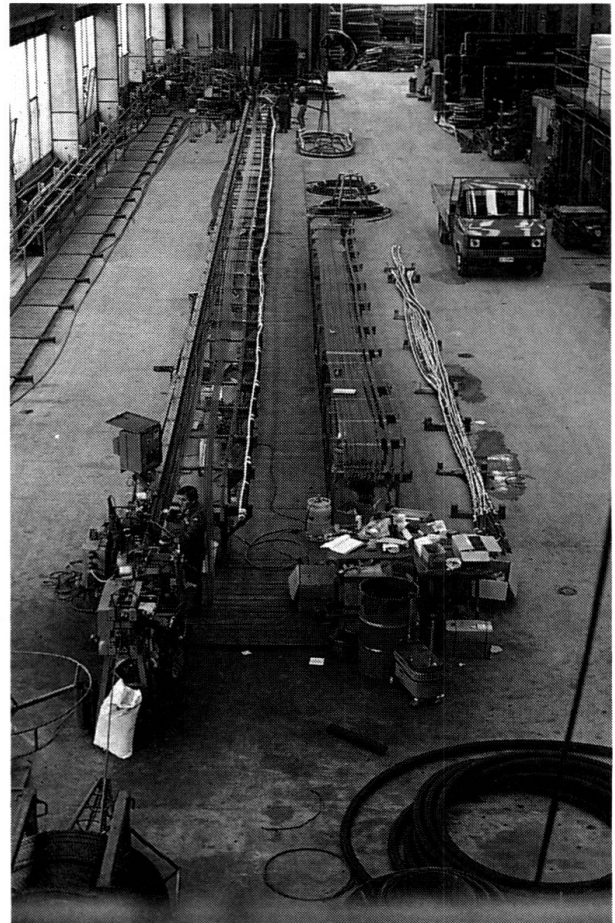
In Zurich, a depot administration building for the regional telecommunication directorate (FKD Zurich) is presently being constructed. This will consist of a large complex having 5 storeys above and 2 storeys below ground level. In order to make maximum use of the plot of land, an excavation approx. 50 × 80 m in size and 8.50 m deep was opened and its walls placed close to the periphery. On two sides these walls are anchored by means of VSL Soil Anchors.

### Extractable VSL Anchors

As part of the anchors penetrate into neighbouring public and private ground, it was a condition that these were made extractable in order to enable them to be removed after use. This condition could be easily met by VSL, who have two types of extractable anchors. Depending upon the requirements, the steel of either the free anchor length or the total length can be removed (extractable VSL Anchors types X<sub>E</sub> and X<sub>T</sub> respectively). The important feature of the extractable VSL Anchors is the special design of the mechanism at the point at which the steel is disconnected.



**Fig. 1** Cross-section of excavation wall with extractable VSL Anchor

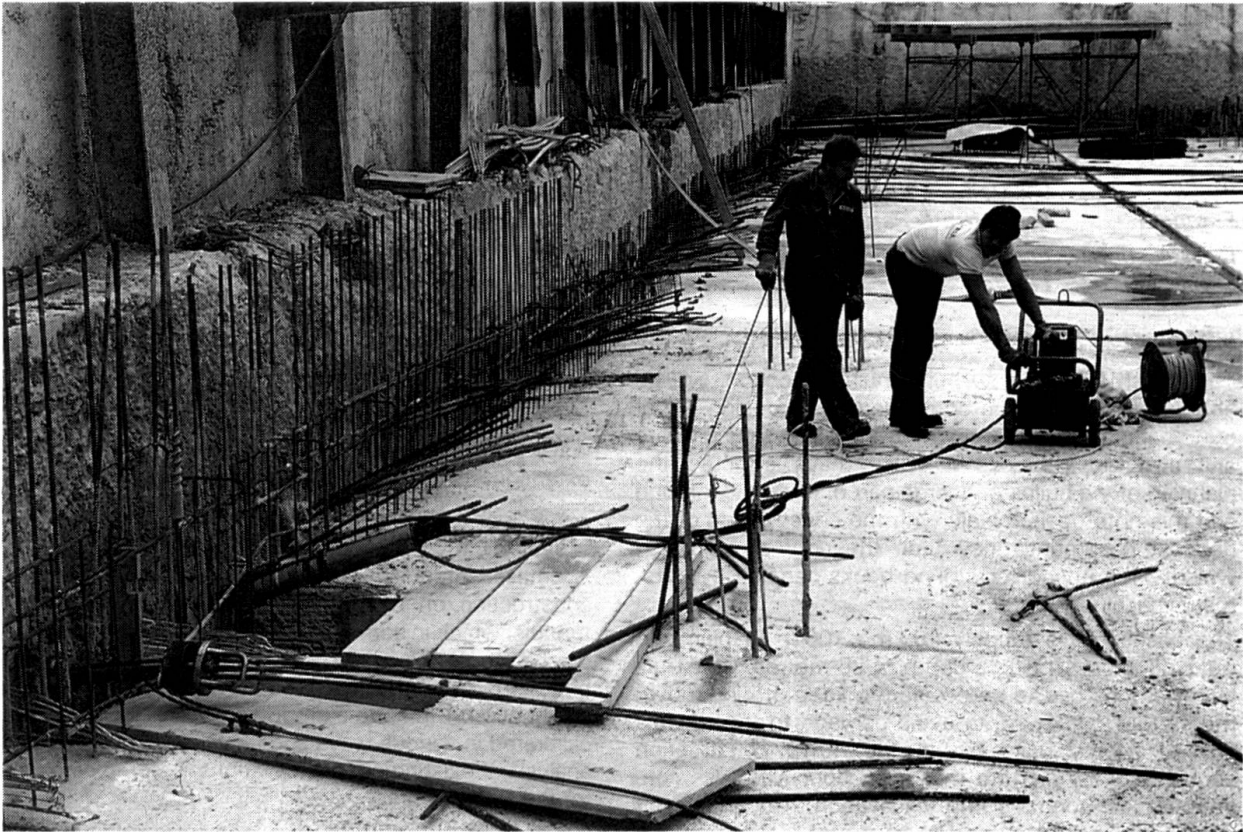


**Fig. 2** Fabrication of the anchors in the VSL workshop

While soil and rock anchors in general result in savings as full use of the excavation can be made, eliminating strutting and earth slopes and enabling mechanized equipment to be used, extraction is an added feature of anchors. More and more regulations require anchors to be made extractable. By using extractable anchors payments for use of adjacent property are reduced or entirely eliminated and adjacent property is left virtually undisturbed.

### Installation and extraction of the VSL Anchors

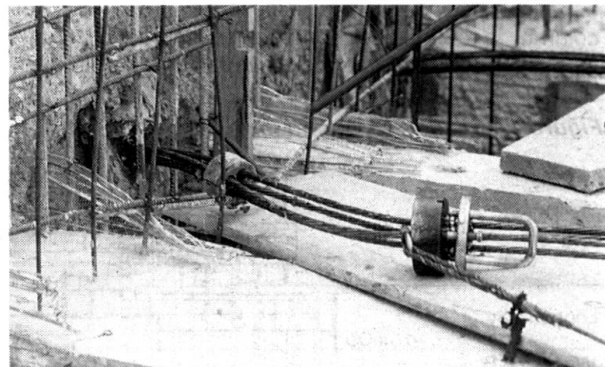
The site in Zurich required a total number of 147 VSL Soil Anchors types 5-4, 6-3 and 6-4, i.e. anchors consisting of 4 strands  $\varnothing$  13 mm (0.5") and 3 and 4 strands  $\varnothing$  15 mm (0.6") respectively. Of these all the anchors types 6-3 and 6-4 were made extractable. The anchors had a free length between 10 and 15 m, the bond length being 6 m throughout. Working loads ranged from 422 to 562 kN.



*Fig. 3 Extraction of a strand*

The anchors were installed in November and December 1986. The boreholes were drilled into the gravelly ground by the percussion method using protection tubes.

Between August and December 1987 the anchors were extracted. Each individual strand was stressed with a monostrand jack until failure in the disconnection mechanism. When all strands of an anchor had been extracted the bundle was removed with a winch and the wedges and the anchor head saved.



*(H. U. Aeberhard)*

*Fig. 4 Strand bundle of anchor being removed*