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**Economic Design of Soldier Pile Walls  
used as Excavation Linings in the Construction of Houses  
and Measures required to Avoid Damages  
to Neighbouring Houses caused by Soldier Pile Pits**

Soldier pile walls are the most economic excavation linings in cohesive and non cohesive soils. They are useful for the construction of houses, too, if the building pit cannot be sloped. Existing dwelling houses can be endangered by a pit in the vicinity. On the one hand the costs for buildings are to be lowered, on the other hand the risks of damage have to be diminished.

This research project is based on the results of measurements taken on 6 Underground pits and on 4 S-Bahn pits in Hamburg. The evaluation of measurements on the S-Bahn pits, accomplished some years ago, had to be revised because of new findings. Forces in struts, deformations and deflection curves of soldier piles, edge pressures in soldier piles, radius of curvature of planks and settlements of buildings in the vicinity were measured. From these results conclusions were drawn on the size and the distribution of the earth pressure, on wall movements and on the fixation of soldier piles in the subsoil. These calculated values were compared with the settlements measured at buildings in the vicinity.

Based on the results as measured detailed recommendations were made with regard to structure, structural analysis and performance of soldier pile walls for houses and to avoid damages to neighbouring houses. Suggestions were made concerning the placing of soldier piles and planks, the largest permissible excavation depth before bringing in the first set of struts, the prestress of struts, the indication error of eccentrically loaded hydraulic jacks, the overloading of struts in order to compensate the loss of prestress caused by the compression of the wedges, the determination of the size and the distribution of an earth pressure larger than the active one taking into account the prestress of struts and planks. Comments were made on the deformation of soldier piles before and after the first set of struts is applied, when prestressing is going on and when the struts are removed.

Finally the advantages and limits for the application of soldier pile walls are compiled.