

## Finite Element Analysis of the Drive Shaft and Jacking Frame Interaction in Micro-Tunneling Method: Case Study of Tehran Sewerage

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**Abstract :** The ever-increasing development of civic demands on one hand; and the urban constrains for newly establish of infrastructures, on the other hand, perforce the engineering committees to apply non-conflicting methods in order to optimize the results. One of these optimized procedures to establish the main sewerage networks is the pipe jacking and micro-tunneling method. The raw information and researches are based on the experiments of the slurry micro-tunneling project of the Tehran main sewerage network that it has executed by the KAYSON co. The 4985 meters route of the mentioned project that is located nearby the Azadi square and the most vital arteries of Tehran is faced to 45% physical progress nowadays. The boring machine is made by the Herrenknecht and the diameter of the using concrete-polymer pipes are 1600 and 1800 millimeters. Placing and excavating several shafts on the ground and direct Tunnel boring between the axes of issued shafts is one of the requirements of the micro-tunneling. Considering the stream of the ground located shafts should care the hydraulic circumstances, civic conditions, site geography, traffic cautions and etc. The profile length has to convert to many shortened segment lines so the generated angle between the segments will be based in the manhole centers. Each segment line between two continues drive and receive the shaft, displays the jack location, driving angle and the path straight, thus, the diversity of issued angle causes the variety of jack positioning in the shaft. The jacking frame fixing conditions and it's associated dynamic load direction produces various patterns of Stress and Strain distribution and creating fatigues in the shaft wall and the soil surrounded the shaft. This pattern diversification makes the shaft wall transformed, unbalanced subsidence and alteration in the pipe jacking Stress Contour. This research is based on experiments of the Tehran's west sewerage plan and the numerical analysis the interaction of the soil around the shaft, shaft walls and the Jacking frame direction and finally, the suitable or unsuitable location of the pipe jacking shaft will be determined.

**Keywords :** underground structure, micro-tunneling, fatigue analysis, dynamic-soil-structure interaction, underground water, finite element analysis

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