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## Design and Construction Issues Associated with SRCSD Tunnel Shafts

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**ABSTRACT:** The Sacramento Regional County Sanitation District is nearing completion on construction of a multi-year, multi-project wastewater interceptor system for the Sacramento area. Many of these projects have involved tunnels and associated shafts. Subsurface conditions range from soft and loose recent alluvial deposits to hard and very dense cemented older alluvium. Construction of shafts has often proved to be problematic. This paper focuses on the design versus contractor-proposed construction methods for four tunnel shafts. Issues include recompression and settlement of shaft foundation materials, groundwater infiltration problems during launch and retrieval, and excavation difficulties. Examples from two specific projects, the Arden Parallel Force Main and the West Sacramento Force Main, which together included 13 tunnelled crossings, illustrate the difficulties associated with shaft construction. For the Arden Parallel Force Main, two deep shafts were constructed in very dense and stiff soils adjacent to the American River using two very different construction techniques: secant-piles and sunken concrete caisson. The difficulties encountered and the relative merits of each shaft construction technique are discussed. For the West Sacramento Force Main, two of the ten shafts experienced construction difficulties. These included problematic stabilization of deep soils beneath the groundwater table during launch and retrieval, potential rebound and settlement of shaft foundation soils, and general issues related to contractor-initiated changes to shaft layout and type. The construction of shafts on both these projects illustrates the contractor's solutions to challenges posed by difficult soil and groundwater conditions and the designer's assumptions of shaft construction technique made during design and demonstrates the need for close coordination between the field and design teams.