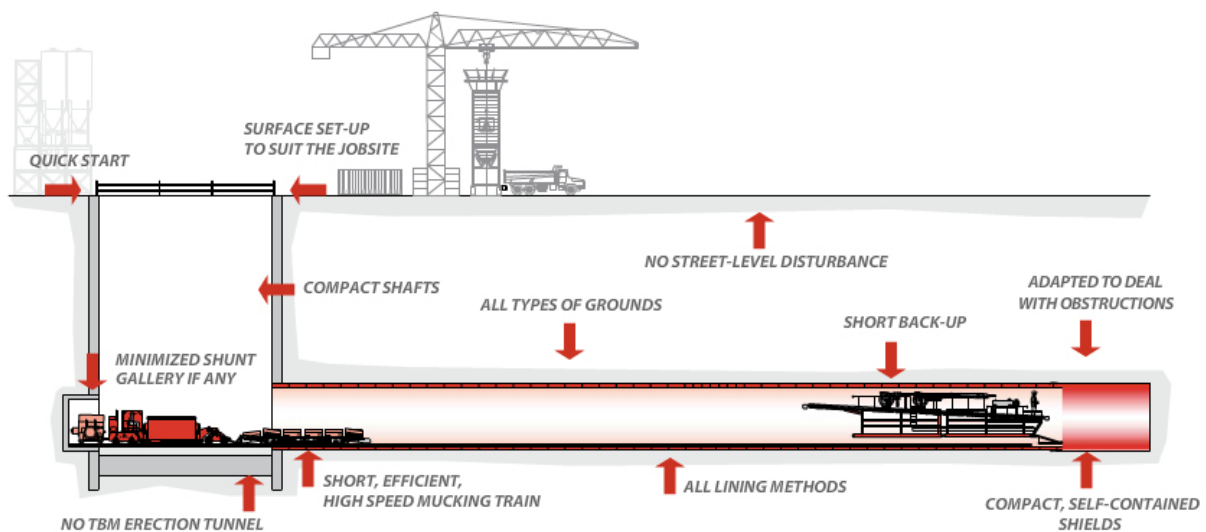


CSM BESSAC

FULLY-OPTIMISED DESIGN



The processes developed by CSM BESSAC are ideal for water and sewage tunnels and service tunnels. They are suitable for shallow tunnel settings as well as deep tunnels. Very short tunnels are feasible without jeopardising safety or project economics. Multiple curves of very tight (less than 50m) radius can be readily accommodated. Combined with the appropriate mucking system, the CSM BESSAC processes are also suitable for very long tunnel drives.

QUICK START

The tunnelling machine is operational as soon as it is lowered to the bottom of the entry shaft. Highly specialised personnel, with intimate knowledge of all parts of the machine, need no learning curve. There is little risk of constructional errors or flaws.

SURFACE SET-UP TO SUIT THE JOBSITE

Between buildings, on a pavement or in a narrow street, CSM BESSAC has worked in very type of situation and can optimise the overall plant layout, especially in urban settings, with minimum impact on the surrounding environment.

NO STREET-LEVEL DISTURBANCE

Street-level settlement is fully controlled by a combination of the convergence-confinement approach and carefully controlled grouting of the annular space behind the linings. Measured values are minimal or below instrument resolution.

COMPACT SHAFTS

Compact tunnelling machines, back-up and mucking trains keep entry and exit shafts small. CSM BESSAC uses conventional timbering, sheet piling, Berlin-type walls and other shaft-sinking methods.

ALL TYPES OF GROUNDS

CSM BESSAC offers versatile processes suitable for all types of saturated or dry ground: loose soil, compact ground, rock, etc.

ADAPTED TO DEAL WITH OBSTRUCTIONS

All the usual underground obstacles in urban settings are quickly identified and safely demolished or removed by hand or machine.

SHORT BACK-UP

With our compact, autonomous shields, back-up becomes simply the interface with the mucking train. It is very short, needs no manually-excavated erection tunnel, and is quickly installed.

MINIMIZED SHUNT GALLERY IF ANY

CSM BESSAC prefers machine layouts needing little or no rear shunt gallery, which always involves risks associated with manual excavation.

NO TBM ERECTION TUNNEL

Our compact tunnelling machines make the erection tunnel unnecessary.

SHORT, EFFICIENT, HIGH SPEED MUCKING TRAIN

Since mucking trains cannot pass each other in small tunnels, CSM BESSAC developed its own exclusive mucking system of high-speed trains with capacity optimised to suit tunnel diameter, with rapid off-loading in the shaft. Only one such train is sufficient, without sacrificing efficiency.

ALL LINING METHODS

CSM BESSAC offers all types of tunnel lining: reinforced concrete segmental linings, jacked pipe, steel rib primary lining, shotcrete, in situ concrete, etc.

COMPACT, SELF-CONTAINED SHIELDS

COMPRESSED AIR SHIELD, EARTH PRESSURE BALANCE SHIELD, SLURRY SHIELD, HARD ROCK TUNNEL BORING MACHINE.