

Metro rail 'stitched' walls to build Central station faster

Surrounding Rocks Filled With Grout Hold Up Structure Instead Of Support Sides Till Base

STRONG FOUNDATION

Illustration: Shinod Akkarapambal

Why Chennai Metro Rail Ltd used the stitch method to build Central Metro station

STITCHING WALLS? WHAT'S THAT?
A method to connect two separate structural walls (which bear load of the entire construction) or to connect a structural wall and a slab which together acts as a monolithic earth retaining structure

WHY USE IT?
At Central Metro underground station, the walls are stitched together with an external wall to save the time it takes to cut through rock to build a diaphragm wall



➤ The soil was cut through to build the outer structure of the station, which includes the diaphragm walls and the base slab

➤ Up to 2m of the rocky soil was excavated to construct the diaphragm wall for Central Metro

➤ The rest of the soil was dug to construct the rest of the station

A 1m thick wall is raised on top to connect the diaphragm wall with the base slab

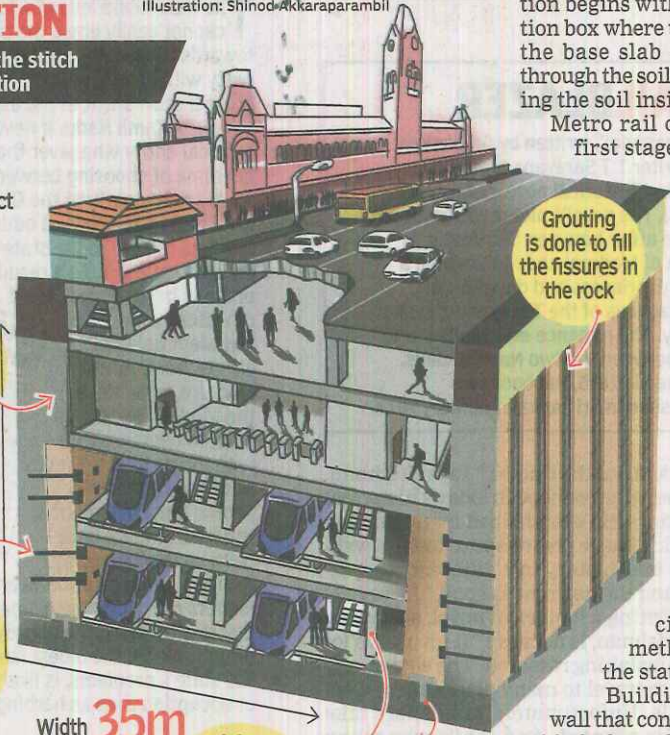
➤ The diaphragm walls and the base slab (floor of the structure) have been connected with a stitch wall

Bolts are drilled into the rocky layer to stabilise the soil

Two layers of concrete is sprayed on the rocky soil and then given a waterproof coating

28m Height

A shear pin or an iron rod is drilled into the rocky soil to connect the diaphragm wall with it



been built completely on rocky soil. "We have built a stitch wall, which is a reinforced concrete stitched with the station diaphragm wall," he had said.

Construction of an underground section begins with the building of the station box where the diaphragm walls and the base slab are built after cutting through the soil. It is followed by excavating the soil inside the station box.

Metro rail officials said it was the first stage in the construction of an underground metro rail facility and was one of the most crucial and complex jobs.

"It takes six months or more to build a station box. That depends on the size of the station and type of soil that is being excavated," a metro rail official said.

As the area where Central Metro has been built comprises mixed strata with hard rock in the bottom and loose soil on top, Chennai Metro Rail Ltd decided to go with the new method to save time and get the station ready.

Building of a stitch wall, the wall that connects the diaphragm wall with the base slab, though may not be as time-consuming as excavating through the hard rock, but has several stages of construction.

Afcons engineers on the job said at Central Metro, they stopped building the diaphragm walls after reaching about two metres into the soil. The engineers then connected the wall to the rest of the soil underneath with a shear pin or iron rod. The soil was then bolted to stabilise it after excavation within the station box.

A part of the wall and the soil leading to base slab was then covered with grout to fill up fissures on the rock and two layers of concrete are sprayed followed by a water proof coating as a protective layer. A one-metre thick wall was then built covering the sprayed concrete layers to connect the diaphragm wall with the base slab, completing the station box.

A part of Central Metro that will connect the airport via Poonamallee High Road is likely to be ready for service within two months.

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The unstable earth that led to several cave-ins and slowed down metro rail construction is now holds up Central Metro station.

How was that possible?
The 30,000sqm station, one of the largest underground facilities in the country, sits on the soil with the support of an external wall 'stitched' against the diaphragm of the station. Chennai Met-

ro Rail Ltd (CMRL) adopted the 'wall-stitching method' to save time while excavating through the charnockite rock to build the outer walls of the station.

Afcons Infrastructure Ltd, the company that built the station, suggested the method to CMRL during the initial stages of the project to reduce the time spent to build the station box or the diaphragm walls of the facility.

Afcons Infrastructure vice-chairman and managing director K Subrahmanian had earlier told TOI that the station had