

## UNDERGROUND METRO: A SOLUTION FOR SUSTAINABILITY

**Vinay Gupta, Managing Director**

*Tandon Consultants Pvt Ltd, New Delhi, India*

Contact: [vinay.gupta@tcpl.com](mailto:vinay.gupta@tcpl.com)

### Abstract

Time is not far when this world will have to find place on other planets to surmount the difficulty of shortage of land on the Earth. Metro has been going underground at many places. Taking a cue from Paris and London, the city appears so neat, when the metro is all put underground, especially in the main city. India is moving very much in the same direction. And underground metro provides effective means of sustainability in many ways. The masses can be transported in urban areas without cluttering the ground level roads. Being underground, the pollution levels are reduced to minimum. Tunnel and many times platforms and OT ducts are made in precast concrete, thereby reducing the quantum of site produced concrete and reduce environmental pollution. Construction of various structures of UG Metro is carried out in a specialized manner. The following paras explain broadly adopted construction methods of each of these.

**Keywords:** Underground, Top-down Construction, Bottom -up Construction, Tunnel Boring, TBM, Cross Passages, Ventilation

### 1 Underground Metro Station

A typical underground metro station has a main station body of about 20m width and 250m length with two levels below the ground, lower level for track & platform and upper level for concourse (paid & unpaid areas). The main station body is flanked by four or more entry-exit structures connecting ground level to the concourse. Figure 1 depicts a typical station footprint. Figure 2 shows inside view of concourse and platform levels (with a large opening at the concourse level in the present case).

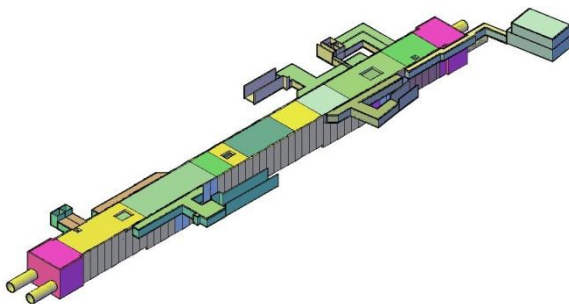


Figure:1- Typical Station Footprint

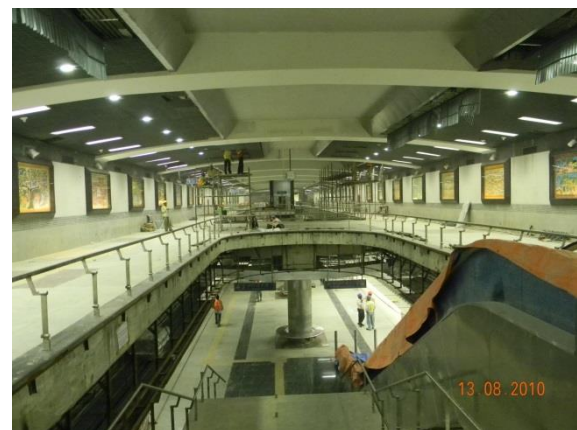


Figure:2- Inside View of Station

### 2 Top-down Method of Construction

Top-down method of construction is more common, as the ground above is usually required for traffic or other uses during construction. This method requires the use of RCC Diaphragm Walls (see figure 3) followed by roof slab, followed by concourse Slab and followed by the base slab wherein connection between Diaphragm Wall and