

Design Used to Build Pier-Less Bridges Across Rivers, Rly Lines Adopted To Install 75m Span On GST Road

# Metro spans flyover sans pillar

V Ayyappan | TNN

It will be a visual spectacle and an engineering marvel when metro rail's elevated corridor is completed over Kathipara flyover. Unique engineering technology adopted to build pier-less bridges across gorges, rivers and railway lines will be used to install a lengthy span across GST road from the proposed metro station at Alandur.

The viaduct starts from Alandur metro rail station and proceeds to soar over two clover-shapes of the grade separator. Balanced cantilever construction will be used to install a 75m span across GST road near Azhar Ghana, where the Alandur station is coming up. Metro rail has

**“WE ARE TAKING UP WORK SIMULTANEOUSLY AT DIFFERENT LOCATIONS AS THE LINE IS SCHEDULED TO BE COMPLETED BY END OF THE YEAR. WE ARE USING BALANCED CANTILEVER METHOD AS WE CANNOT STOP TRAFFIC**

SENIOR METRO RAIL OFFICIAL

begun to build spans over the busy flyover that links the city to the airport and the suburbs beyond.

“We have to use this method because we cannot stop traffic on the flyover to install segments of the span. There is no space in between the piers to install temporary shoring because of the presence of the flyover. So, we have decided to use the balanced cantilever technique,” said a senior official of Chennai Metro Rail.

Balanced cantilever technology involves making several concrete segments of a span on top of the piers using a bridge builder. Two bridge builders will be placed atop the two piers and the span between the piers is built by casting concrete segments. Elsewhere, metro rail uses launch girders to install pre-cast segments, which are manufactured at a far-away location, to make a span between piers.

“Here, we cannot use pre-cast segments because distance between the

two piers is 75m. That's too far to use launch girders to lift pre-cast segments from the ground and install it using winches. There is no space on the ground to move pre-cast segments because of the flyover,” he said.

Metro rail will make 12 segments from each pier and will join them in the middle over GST road flyover to make a span. The segments will be built simultaneously from both piers to avoid alignment and height variation. There will be 24 segment pieces and one connector piece. These segments will be designed to support the load without a pier.

“We will use launch girders to install pre-cast segments and make spans over the rest of the stretch because space is available within the arms of the flyover to move pre-cast segments,” said an official.

Bridge builders have been installed above two piers and work on casting the segments has begun. The distance between piers varies depending upon the alignment, but the distance is between 15m and 30m.

The elevated viaduct from Nehru statue to 100 Feet road is being built like a jigsaw puzzle. Spans have been completed till Olympia Technology Park and the stretch will soon be linked to the pier near Nehru statue from where the balanced cantilever bridge is going to be built.

Metro rail has completed 107 of the 131 spans that are needed be-

tween Ashok Nagar to St Thomas Mount.

“We are taking up work simultaneously at different locations as the line is scheduled to be completed by end of the year,” said an official.

Delhi metro has used this technique to make a viaduct over a flyover and a railway line. Construction would be more or less similar. Delhi metro used more than 160 workers to complete the 100m span.

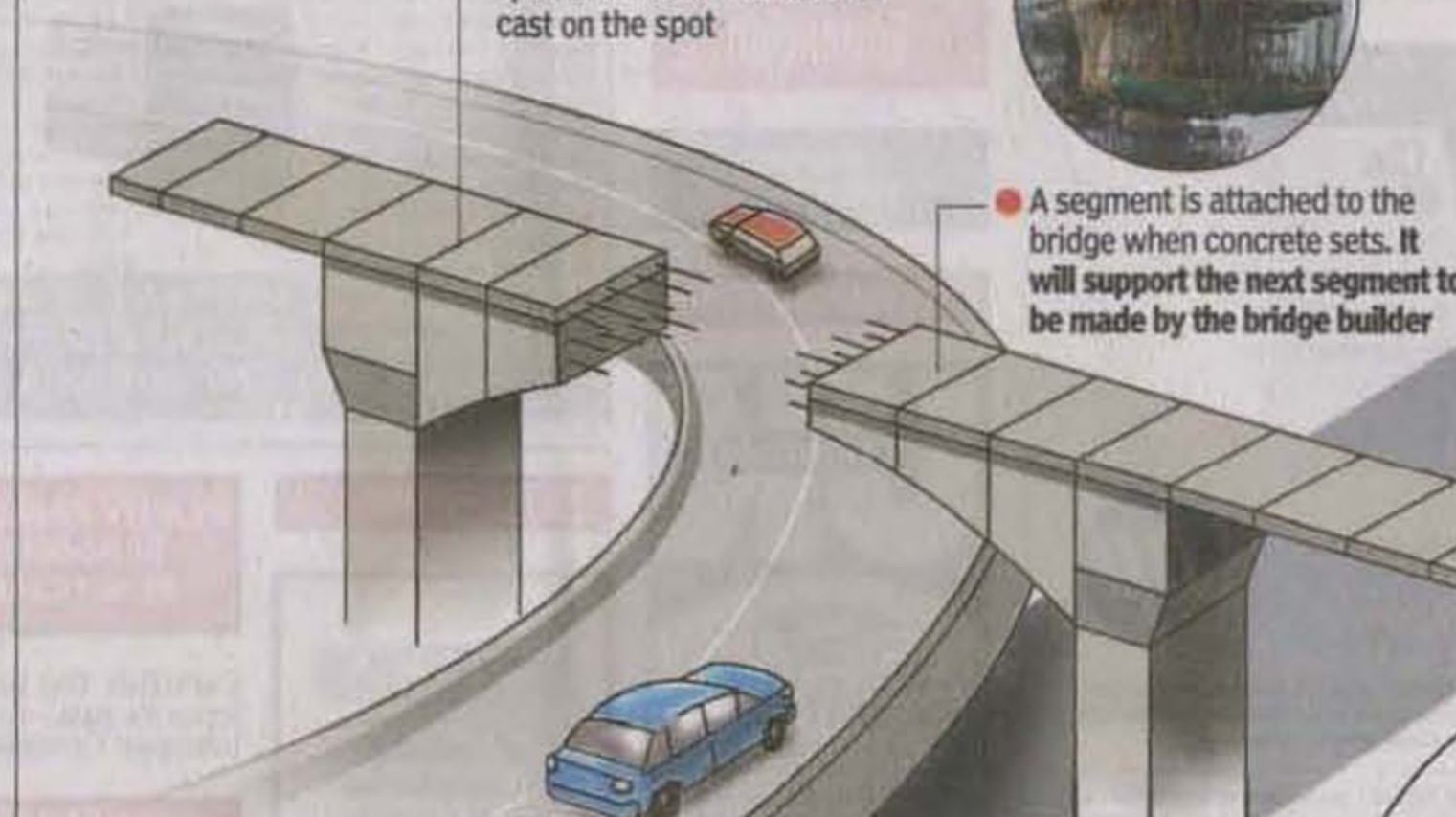
The stretch is part of the Koyambedu-St Thomas Mount elevated line which is slated to be completed by the end of the year. The line is expected to be commissioned by mid-2014.

## OVER THE TRAFFIC

The balanced cantilever method is being used to build the 75m span between two piers across GST Road near Alandur metro rail station as traffic cannot be stopped because the road connects the airport to the city and there is no space at Kathipara junction for cranes

### STEP 1

- A bridge builder is placed on top of a pier and concrete segments used to build the span of the elevated line are cast on the spot



Bridge builder

- A segment is attached to the bridge when concrete sets. It will support the next segment to be made by the bridge builder

### STEP 2

- Another bridge builder is used to make segments on another pier. Segments are made from both piers and joined in the middle using a connector



- Metro rail is using the balanced cantilever method because there is no space on the ground between the piers to install temporary support structures or manoeuvre cranes



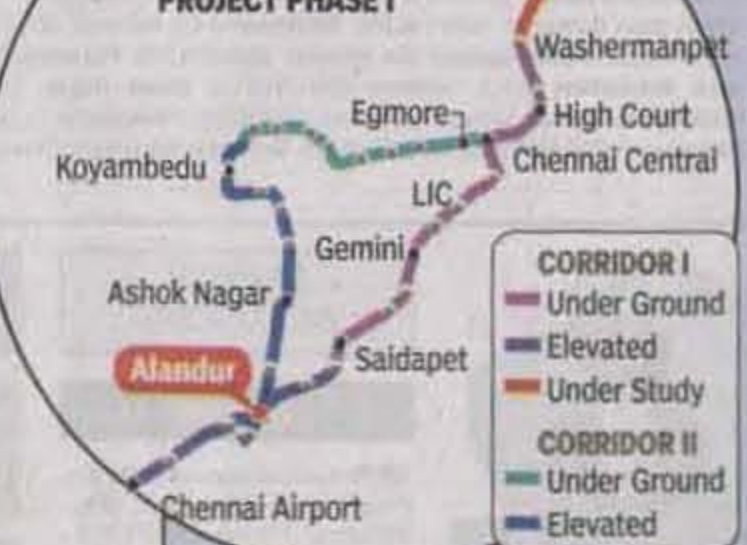
- Delhi metro has used this technique to build a viaduct over a flyover and a railway line. The construction method in Chennai will be more or less similar

### ON THE MAP



The span is being built at Alandur metro rail station and proceeds to soar over Kathipara grade separator

### ALIGNMENT MAP OF CHENNAI METRO RAIL PROJECT PHASE I



### ADVANTAGES

- ▶ Makes construction possible even when access below the bridge is impossible
- ▶ Best method in urban areas because temporary shoring is not possible
- ▶ Process is safe, and can be used even if there is a curve on the bridge

### DISADVANTAGES

- ▶ Construction is slow because segments are made on location, not pre-cast elsewhere
- ▶ Work is exposed to weather
- ▶ High precision is required as segments are built from two ends simultaneously