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Wind Structure Interaction on 235 m Tall RCC TV Tower in Delhi

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All India Radio has started the construction of an RCC TV tower, the first of its kind in India, 235 M height with revolving restaurant and viewing gallery at top, in the North - West suburban parts of Delhi, surrounded by industrial and residential area.

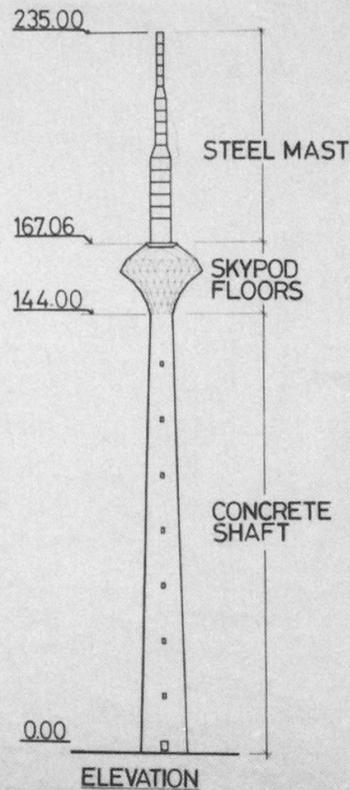
In connection with the above design Indian Meteorological Department (IMD) was requested to undertake analysis of surface and pilot balloon winds at Delhi air-port, to obtain wind escalation law. Utilising available surface upper wind and temperature data spread over long periods, IMD obtained the extreme values of wind and return period with different confidence limits. IMD further correlated the IS code wind figures with the extreme values obtained by their study, indicating the probabilities of occurrence of tornado and storms with return period, by determining maximum wind causing collapse of the structure.

The highest wind value recorded was 159 km/h in 1960. Wind speed for return period 100 years was determined at 175 km/h. For this, with confidence level (95%) and correction (31) wind speed was obtained as 206 km/h for the design. Since Delhi was affected by severetornado in 1978 with damaging wind speed of 250 km/h, the value of the power law co-efficient was worked out to be $1/9$ under unstable and neutral conditions and $1/3$ for stable conditions.

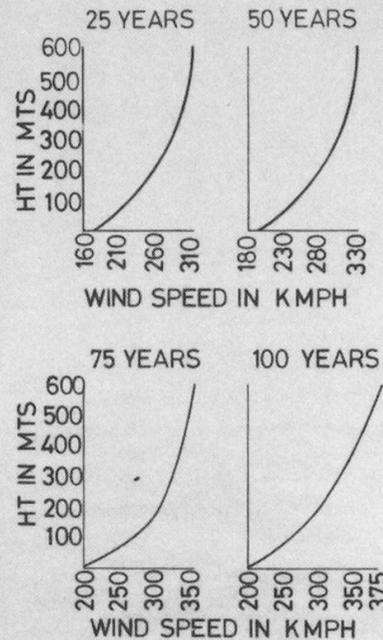
The power-law co-efficient $1/7$ suitable for the change of gust speed with height was used for deriving wind profile.

Wind profile and a few structural details of pile cap, shaft and mast of this unique tower are shown in the photograph.

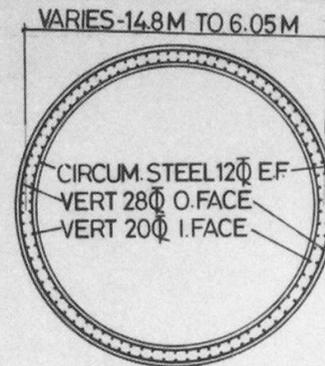
WIND STRUCTURE INTERACTION ON 235 M TALL RCC TV TOWER



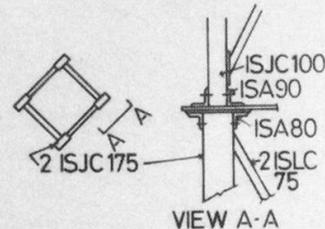
THE RCC TV TOWER OF HEIGHT 235 MTS. IS THE FIRST OF ITS KIND IN INDIA WITH REVOLVING RESTAURANT AND VIEWING GALLERY AT TOP. THE TOWER IS COMING UP IN NEW DELHI.



WIND PROFILE IN THE REGION OF DELHI BASED ON CONFIDENCE LIMIT 95% FOR THE HIGHEST WIND SPEED AT SURFACE WITH RETURN PERIOD. WIND SPEED FOR RETURN PERIOD 100 YEARS WAS DETERMINED AT 175 KM/H. FOR THIS WITH CONFIDENCE LEVEL 95% AND CORRECTION 31 WIND SPEED WAS OBTAINED AS 206 KM/H FOR DESIGN.

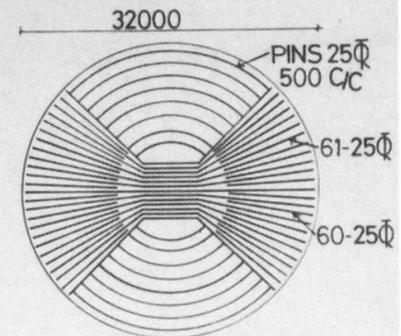


STEEL DETAILS IN SHAFT

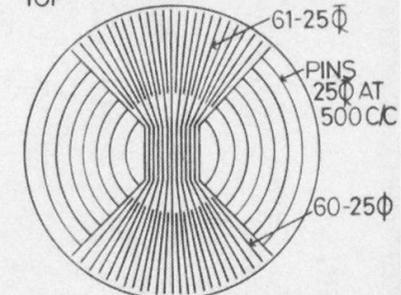


TYP DETAIL OF JOINT-MAST
WIND VELOCITY 162 KM/H AT 10M HT. POWER LAW INDEX $1/\alpha = 1/7$, GUST FACTOR 1.35; DRAG CO-EFF OF 1.1 FOR MAST & SKYPOD AND 0.7 FOR SHAFT IS CONSIDERED FOR DESIGN.

SKYPOD IS DESIGNED AS COMPOSITE SECTION WHICH IS A COMBINATION OF STRUCTURAL STEEL AND REINFORCED CONCRETE.



PLAN DETAILS OF REINFORCEMENT FOR 1, 4, 7, 10 & 13TH LAYER AT BOTTOM AND 16TH LAYER AT TOP. CONCRETE MIX M 250. THERE ARE TOTALLY 15 LAYERS AT BOTTOM AND 3 LAYERS AT TOP.



PLAN DETAILS OF REINFORCEMENT FOR LAYERS 2, 5, 8, 11 & 14 AT BOTTOM AND LAYER 17 AT TOP. ALL OTHER LAYERS ARE TANGENTIAL BARS. PINS OF LAYER 1 ARE BENT UP TO FORM PINS OF LAYER 2 AND HENCE CONTINUOUS.