



अमृतं तु विद्या

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14/3/2017

**REPORT ON REVIEW OF**

**ANALYSIS & DESIGN FOR 150 METER LATTICE WIND MAST**

The above job was assigned to Sardar Patel College of Engineering, Mumbai – 400058, by M/s Clique Consultants Pvt. Ltd., 602, Shreenath Apartments, Liberty Garden Cross Road No. 3, Malad ( W ), Mumbai – 400 064 on behalf of M/s Ramakrishna Iron Works Private Limited, Mumbai.

The scope of the job is to review the Analysis & Design and drawings of 150 meter Lattice Wind Mast and Calculation submitted by M/s Clique Consultants for the wind mast for wind speed 55 Meter/sec

The following documents were submitted to us for the scrutiny by M/S Clique Consultants.

1. Engineering 3-D Model of Structure in STAAD Pro.
2. Certificate vides Letter CC 17 / C500 / 015 dtd Mar. 01, 2017 for 150M Lattice Wind Mast.
3. C500 / CI / DS / A4 / 101, R0  
Analysis and Design Review Report for 150M Lattice Wind Mast for 55mps Wind Velocity
4. Drawings mentioned below.

**ASSEMBLY DRAWINGS:**

1. C500 / CI / GA / A0 / 103, R0  
150M Tall Wind Mast: Assembly
2. C500 / CI / GA / A3 / 104, R0  
150M Tall Wind Mast: Boom Assembly
3. C500 / CI / GA / A1 / 105, R0  
150M Tall Wind Mast Lightning Arrester, Sensor Positions, Working Platform, Fall Arrest Details
4. C500 / CI / GA / A1 / 106, R0  
150M Tall Wind Mast: G A & R C Details Of Foundation



## FABRICATION DETAILS DRAWINGS:

1. C500 / CI / FB / A1 / 107, R0  
150M Tall Wind Mast- Fabrication Details of Mast Segment S1
2. C500 / CI / FB / A1 / 108, R0  
150M Tall Wind Mast- Fabrication Details of Mast Segment S2
3. C500 / CI / FB / A1 / 109, R0  
150M Tall Wind Mast- Fabrication Details of Mast Segment S3
4. C500 / CI / FB / A1 / 110, R0  
150M Tall Wind Mast- Fabrication Details of Mast Segment S4
5. C500 / CI / FB / A1 / 111, R0  
150M Tall Wind Mast- Fabrication Details of Mast Segment S5
6. C500 / CI / FB / A1 / 112, R0  
150M Tall Wind Mast- Fabrication Details of Mast Segment S6
7. C500 / CI / FB / A1 / 113, R0  
150M Tall Wind Mast- Fabrication Details of Mast Segment S7
8. C500 / CI / FB / A1 / 114, R0  
150M Tall Wind Mast- Fabrication Details of Mast Segment S8
9. C500 / CI / FB / A1 / 115, R0  
150M Tall Wind Mast- Fabrication Details of Mast Segment S9
10. C500 / CI / FB / A1 / 116, R0  
150M Tall Wind Mast- Fabrication Details of Mast Segment S10

A couple of meetings took place between Dr. M. M. Murudi, Professor in Structural Engineering Department & Vice-Principal of S.P.C.E., Dr. A. A. Bage, Associate Professor & Head of Structural Engineering Department, Mr. D M Senjalia, Director, M/S Clique Consultants Private Limited, Mr. A. D. Paranjape, Director, M/S Clique Consultants Private Limited, Ms. Zeenat Tai & Mr Vivek Singh, Assistant Engineer from M/S Clique Consultants Private Limited to discuss and clarify certain information regarding the analysis and design of the above referred Project. The suggestions / recommendations emerging out of discussions have been incorporated in the final design.

Wind Mast Structural System is designed for 55 Meter / sec wind speed, structure is of square shape, having size 450 mm x 450 mm formed by four corner legs of SHS 60x60x5 mm up to height of 80meter from ground and 350mm x 350mm formed using Four corner legs of SHS 40x40x4 mm above 80m.

For stability against lateral load, all corner legs are braced in horizontal & inclined direction by 12 mm square bar, grade of all steel material is  $f_y$  250 MPa.

To control the deflection against Lateral Forces, Lattice structure is tied at every 10 meter height with 8 mm dia Galvanized Steel Wire Ropes in 6/19 (12/6/1) Construction in all four





directions. The wire ropes adopted are of Grade 1570 MPa. Minimum breaking force for Fibre Core steel wire ropes up to 110m level is 31 kN. However, for additional safety purpose wire rope at and above 120m provided is steel core with a minimum breaking force of 33 kN.

2.5 kN Pre-Tension is Applied in Steel Wire Ropes for up to 110m level and 3.0kN for 120m level & above to keep them taught and ensure that Wire Ropes are under Tension under all Possible Load Combinations.

At the Tower Top / Intermediate Levels Boom is provided to support Wind Sensors. Boom is projected by 2650 mm from tower, structural System for same consists of 38 mm dia 4.5mm thick Pipe & 20 NB medium sized Pipe bracket.

For wind forces generation IS 875 –2015, Part-3 , including dynamic effect, are considered, 3-D analysis is carried out for the Structure with help of STAAD Pro Software to find out the forces in members of structural system & at Foundation Level. To Capture the 3 dimensional behavior of Cable, Non Linear Analysis for Cable is performed with the help of STAAD Pro Software.

Following are our observations and comments made during the scrutiny work.

1. The loads considered in the design are as per the norms laid down by IS 875:2015
2. The grade of concrete used is M-25 and Reinforcement Steel used is Fe-415.
3. The structure has been analysed for lateral loads arising due to wind load conforming to IS 875:2015 Part-3 , including dynamic effect
4. The structural elements of the mast and boom are designed as per IS 800: 2007.
5. Footings are designed as per IS 456:2000.

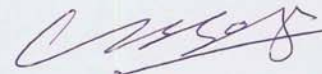
Finally, the structural model is checked after accounting for the above mentioned loads. The steel sections including bracing members selected for the steel mast are adequate and design is safe. For footings, the area of the steel reinforcement, grade of concrete and steel chosen are adequate and design is safe. The structural design calculations satisfy the requirements of IS 456:2000, IS 875:2015 and IS 800:2007.

Faculty members involved

Dr. M. M. Murudi



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