As an improvement program by Archeological Survey of India (ASI), Hyderabad, the Director of ASI decided to take the support of latest technology such as LiDAR Scanning to support their on-going digitization and documentation project. As a result of this, on 6th April, Director instructed Ansari Precision Instruments Private Limited (**APIPL**) team to conduct a pilot **LiDAR** scanning of 11th Century Kakatiya temple in Karimnagar, AP. Accordingly, APIPL team conducted the LASER Scanning on 12/13 and 14th of April under the supervision of Archeological Survey of India and Deccan Heritage Foundation (**DHF**) team. To prove the usability of Laser Scanner in ASI's workflow, APIPL executed this scanning project at own cost.

Below is the report prepared along with DHF to help ASI to evaluate the application of Laser Scanning Technology in Archeology.

Procedure followed for scanning of Temple

1. Reconnaissance Survey and quick scan on 6th of April
2. Analysis of the quick scan data
3. Plan for the actual High Density scan
4. High Density LiDAR Scanning at site on 12th and 13th of April
5. Registration or Merging of Different Scans on 16th and 17th of April at Bangalore office
6. Preparation of 2D/3D models & drawings from the registered scan *(Samples below)*

Scan Summary

Number of Scans:

a. To cover exterior of the Temple: **11 Scans**
b. To cover interior of the temple: **8 Scans**
c. To cover chambers: **10 Scans**
d. To cover top of the temple: **1 Scan**

Total Time taken for scanning: ~30hrs,

Total time taken for registration: ~12 hrs

Size of the final merged scan: 4GB

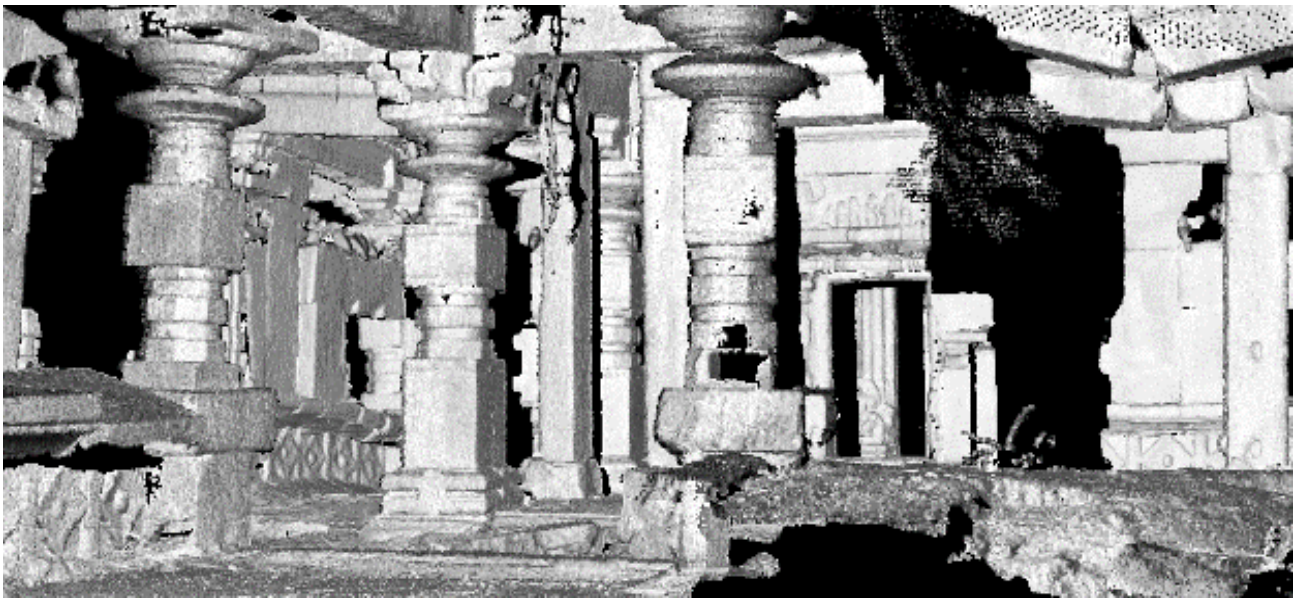
No of Scans to cover the entire Temple: 30 Scans

Kakatiya Temple

Point cloud which is measurable and to scale

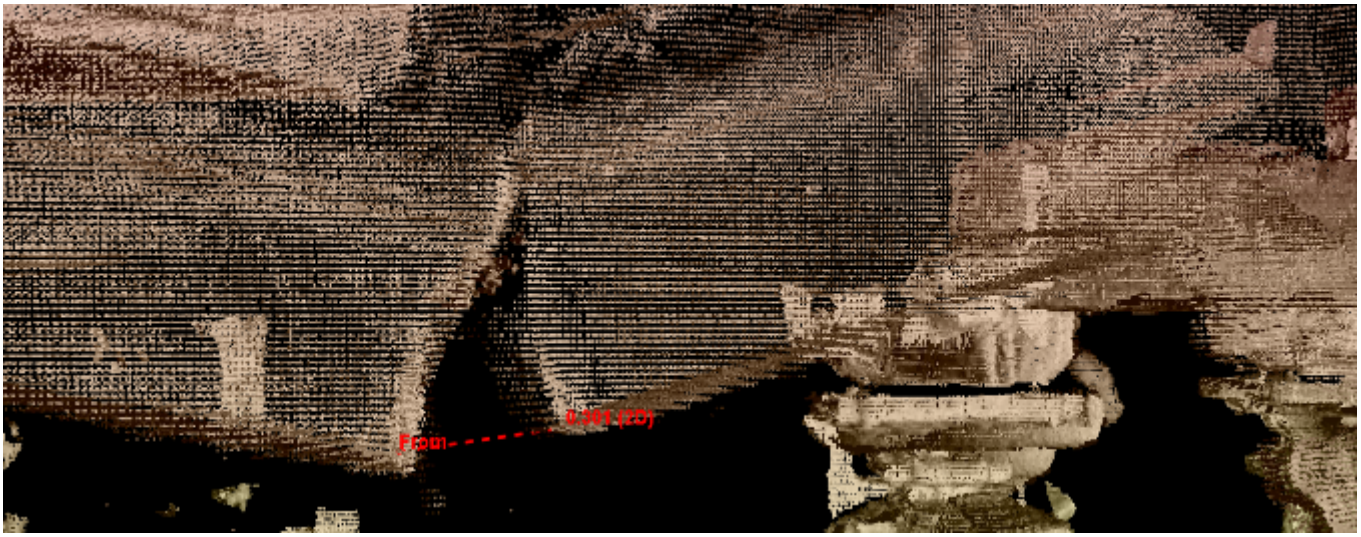
Samples of Kakatiya LiDAR Scanning

Isometric View

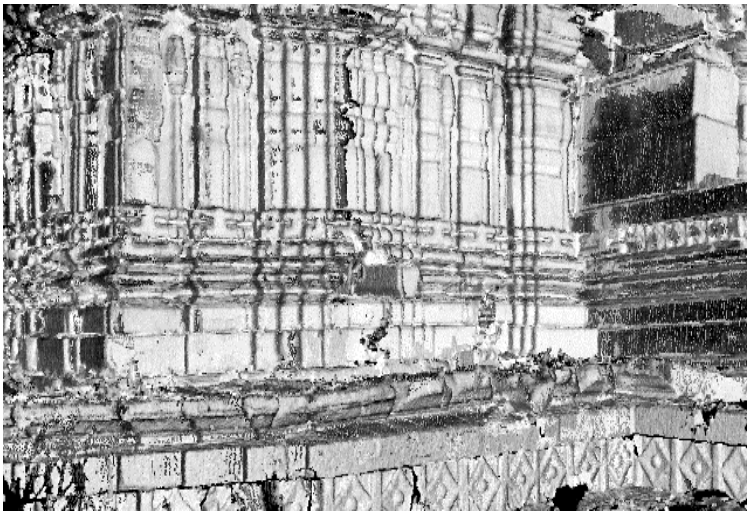


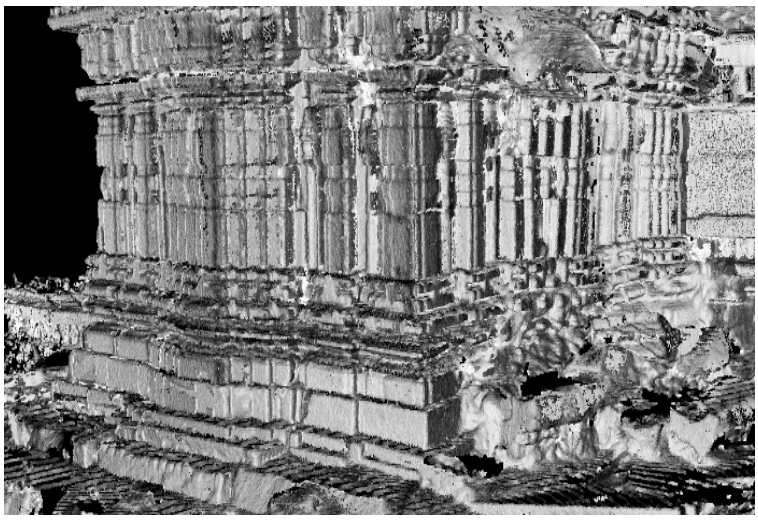
High Density point cloud from single scan which can be used for drawing the 2D/3D features

Interiors of chambers (roof), accurately scanned by scanner which cannot be mapped by any other means.



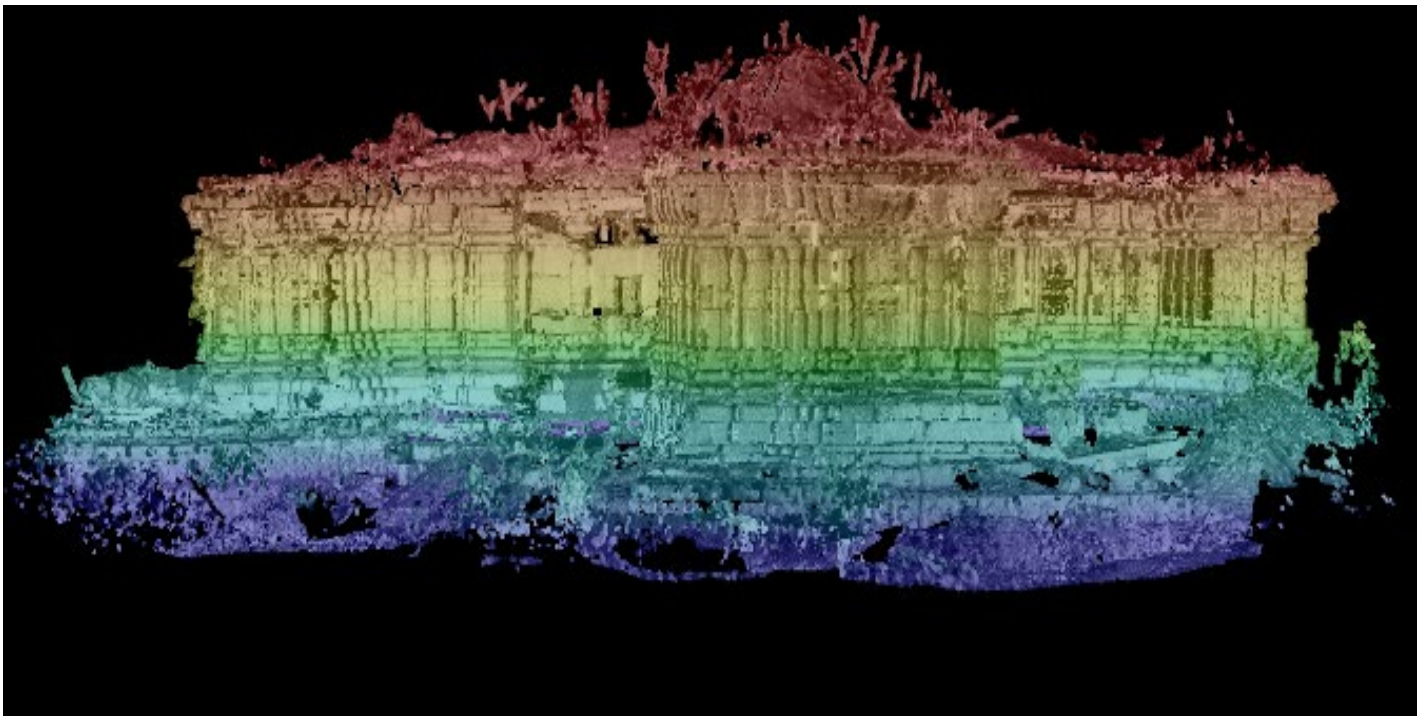
Measurement of structural damage caused due to overload on the beam

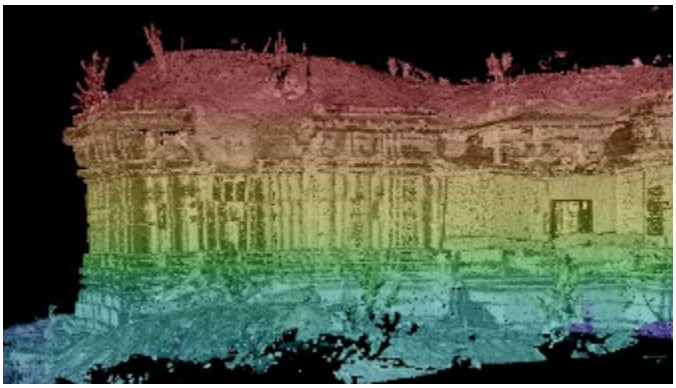


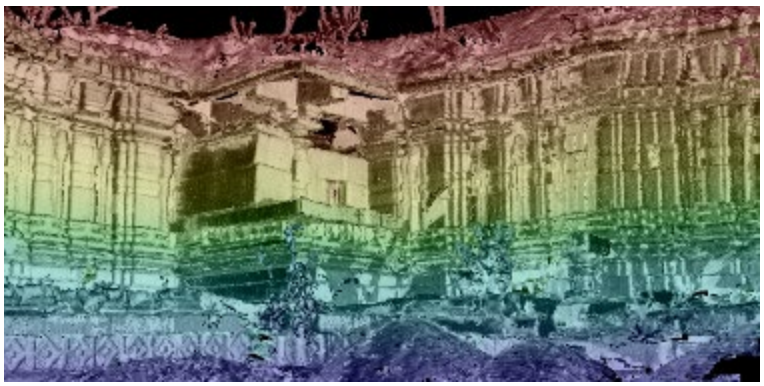


Closer look at the LiDAR model on which ASI can conduct research and create drawings for documentation. Minute details of the designs on the wall can be seen and it can be documented as it is and it will be to scale

LiDAR data which can be utilized for analysis of extent of damage caused, planning of repair, material calculation and cost estimation

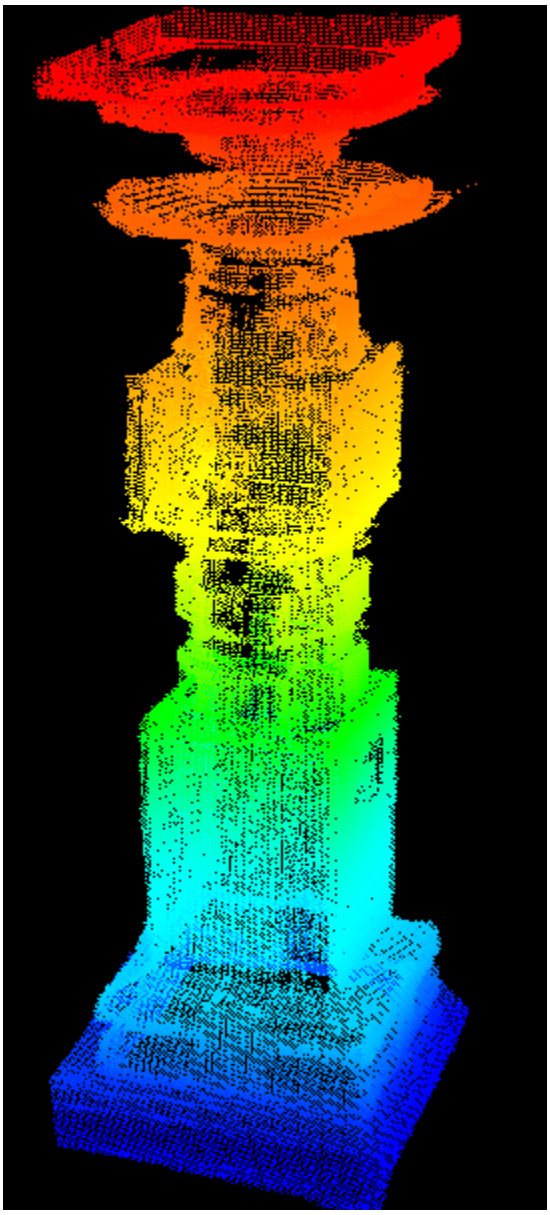


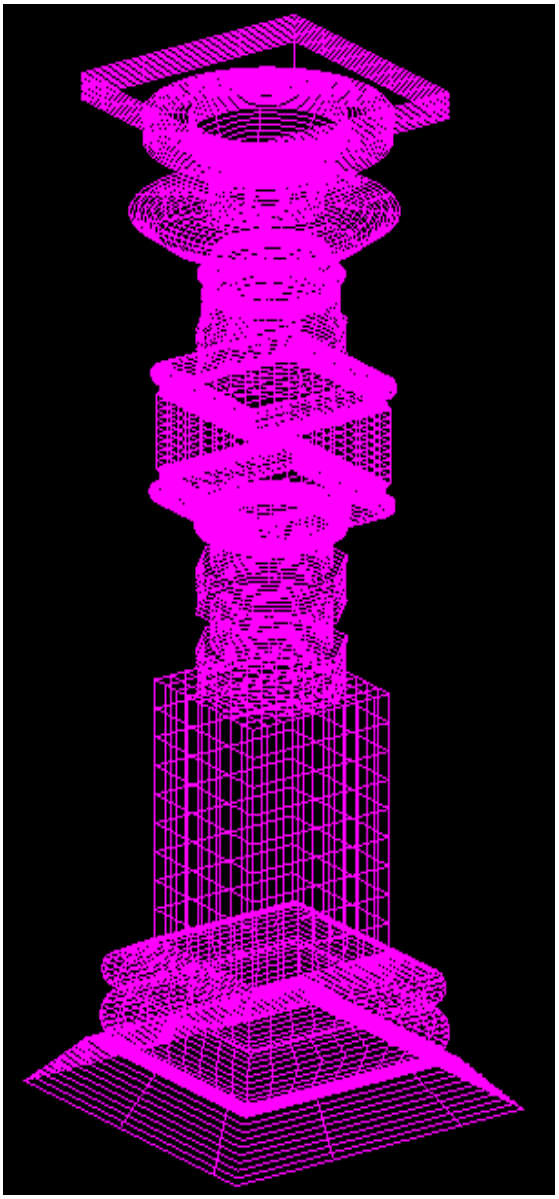




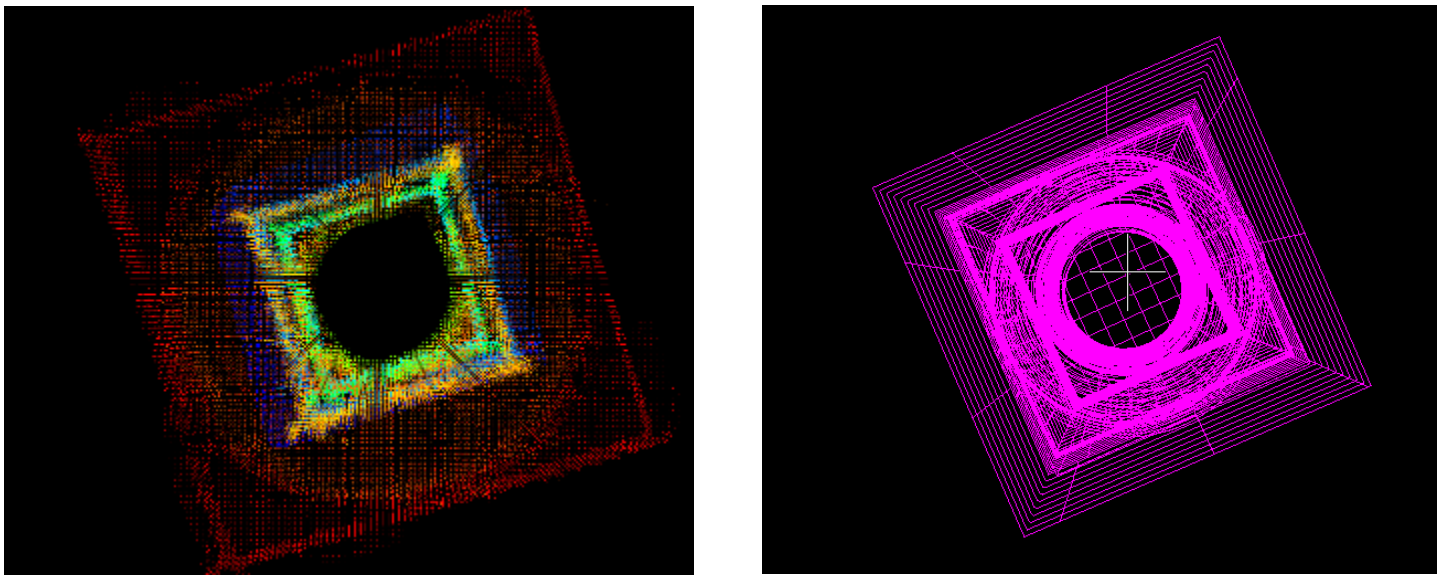
LiDAR data can be viewed in colored by height/colored by relief mode for easy modeling

Isolating structure of importance and analyze the same for damage or documentation in 3D. Similarly, any statue or structure of importance can be modeled and documented

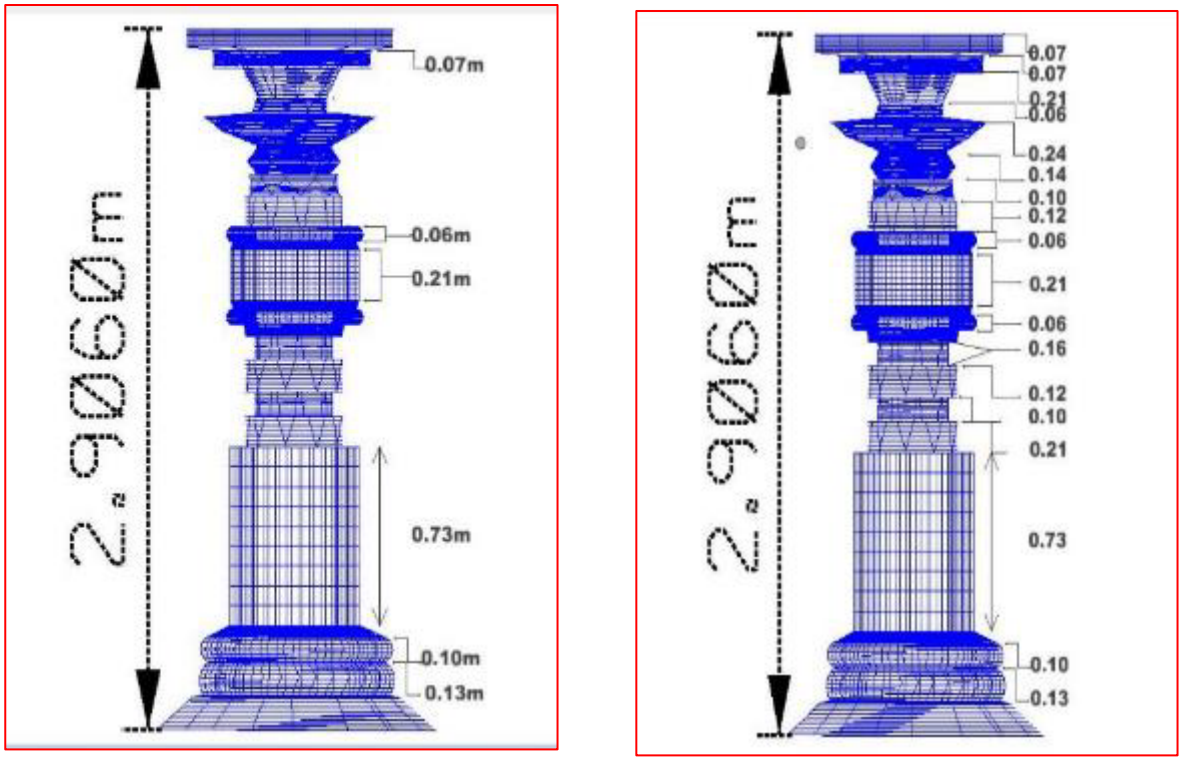




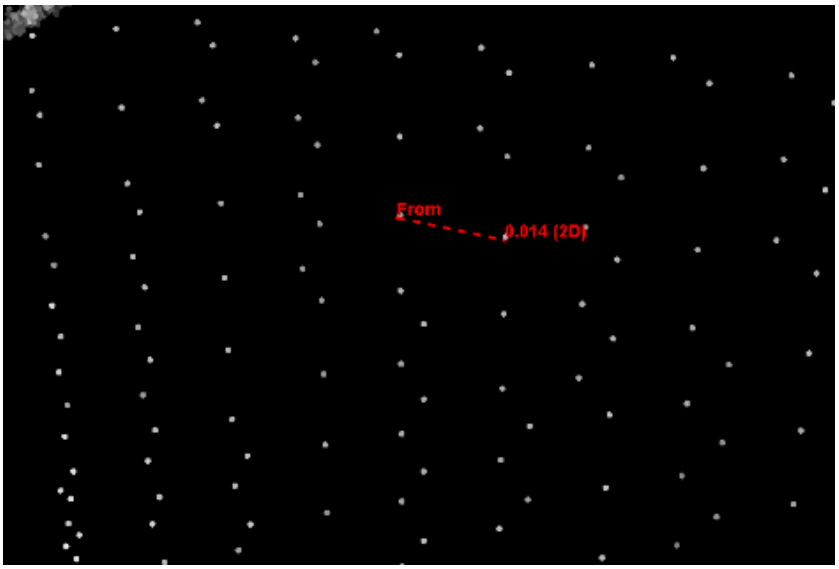
Example of 3D drawing preparation from the point cloud. This is what ASI is looking for as a part of documentation and LASER Scanning is the only solution of accurate documentation of such complicated structures



Top view of the pillar as seen in point cloud and wire frame



Measurement of the 3D Pillar – A must for documentation



Distance between two points = 14mm (high density) which cannot be obtained by a Total Station

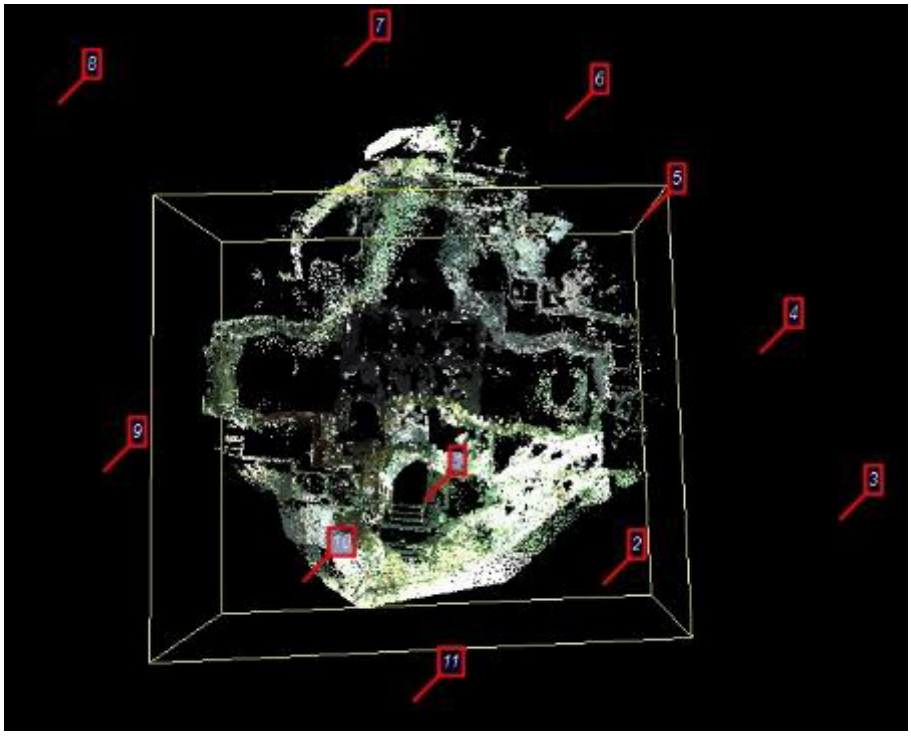


Image showing origin of 11 scans carried out to capture external view of the temple with location of origin of the scanner